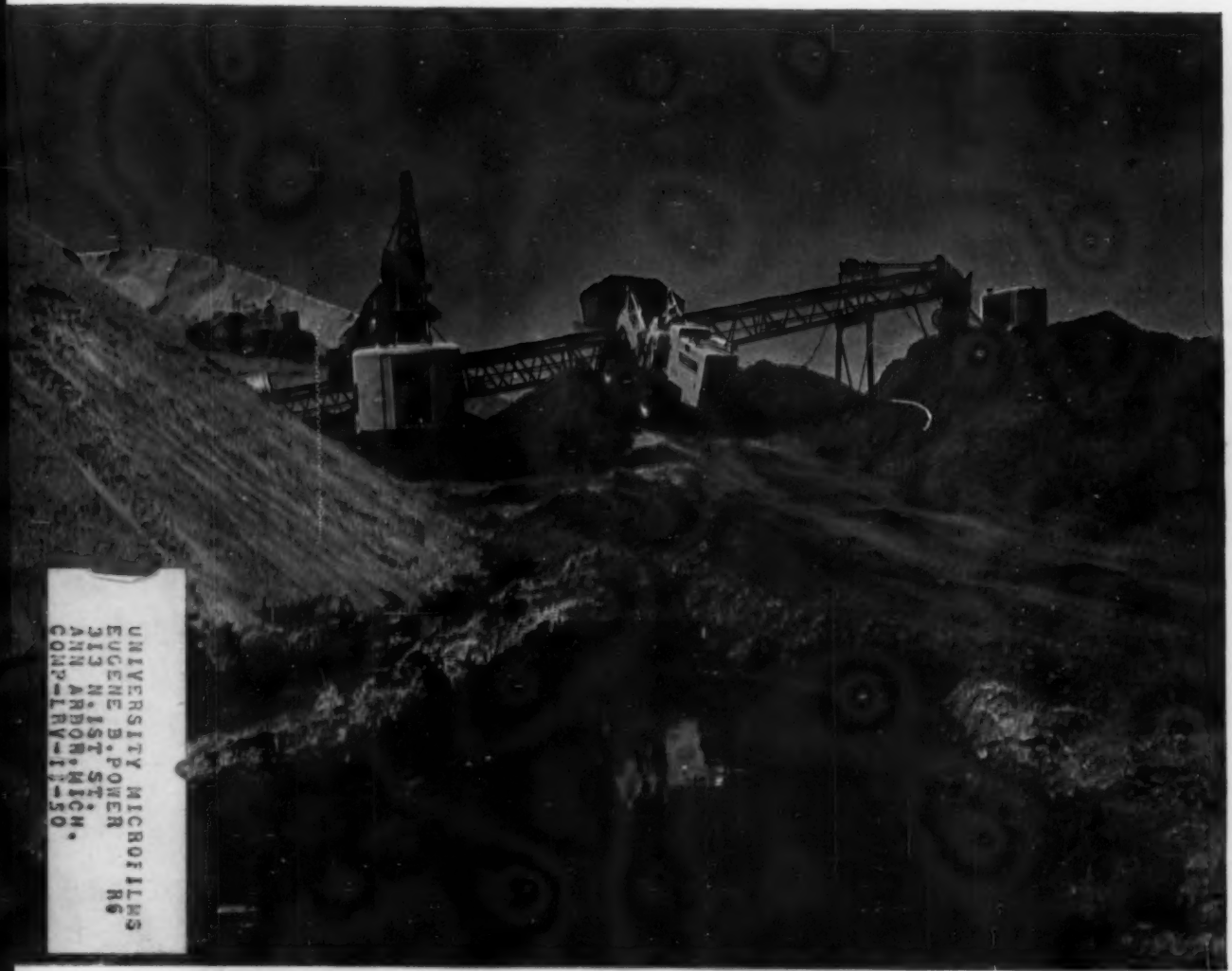
ROADS AND STREETS

April, 1960

A GILLETTE PUBLICATION



UNIVERSITY MICROFILMS
EUGENE B. POWER
313 N. 1ST. ST.
ANN ARBOR, MICH.
CONST-TRAN-1-50

Skillful Retaining Wall Work Along Depressed Freeway page 54

6 UNITS ABREAST FOR MAXIMUM COVERAGE

*

6 UNITS IN TANDEM FOR MAXIMUM ONE PASS CONSOLIDATION

4 UNITS (or it might be 5) TO EXACTLY FIT JOB WIDTH REQUIREMENTS

*

5 UNITS IN TANDEM AND STAGGERED, VARIABLE FOR A WIDE RANGE OF WIDTHS

*

4 UNITS TOWED AT SIDE OF TRACTOR. IDEAL FOR ONE PASS WIDENING OPERATIONS.

SHOULDER COMPACTION IS AUTOMATIC. End unit automatically assumes this position — no adjustment required. Prevents raveling.

*Attainable with optional equipment.

may be pushed or pulled by any prime mover capable of working speeds as low as 50 FPM; towed to location at any road speed; operated in either direction; controlled by prime mover operator. Two workheads, with as many as 4 units each may be employed, one ahead and one following trailer. Power plant supplies both single and 3-phase 110-115 volt, 60 cycle A.C. and has many uses.

4200 3-TON VIBRATORY BLOWS PER MINUTE AND UNMATCHED VERSATILITY MAKE...

JACKSON Your Best Bet for RAPID, MONEY-SAVING COMPACTION!

In laying macadam base courses of very coarse aggregate (¾" to 3½") for instance, a single spread 12" thick usually can be perfectly compacted with just two passes of a JACKSON COMPACTOR. Time required is just about one-half that required for rolling . . . and appreciable savings are effected by single course spreading. Fines can be laid in thicker layers, with no hand brooming required, and each spread thoroughly infiltrated in a single pass.

For compacting granular soils in practically all applications, JACKSON COMPACTORS are terrific economizers of both time and money . . . the most efficient and versatile machines in the compacting category. See them at your nearby JACKSON Distributor who has them both for sale and for rent. Literature on request.

BOTH MACHINES OPERATE IN EITHER DIRECTION, NO TURNING REQUIRED

JACKSON VIBRATORS, INC.

LUDINGTON • MICHIGAN

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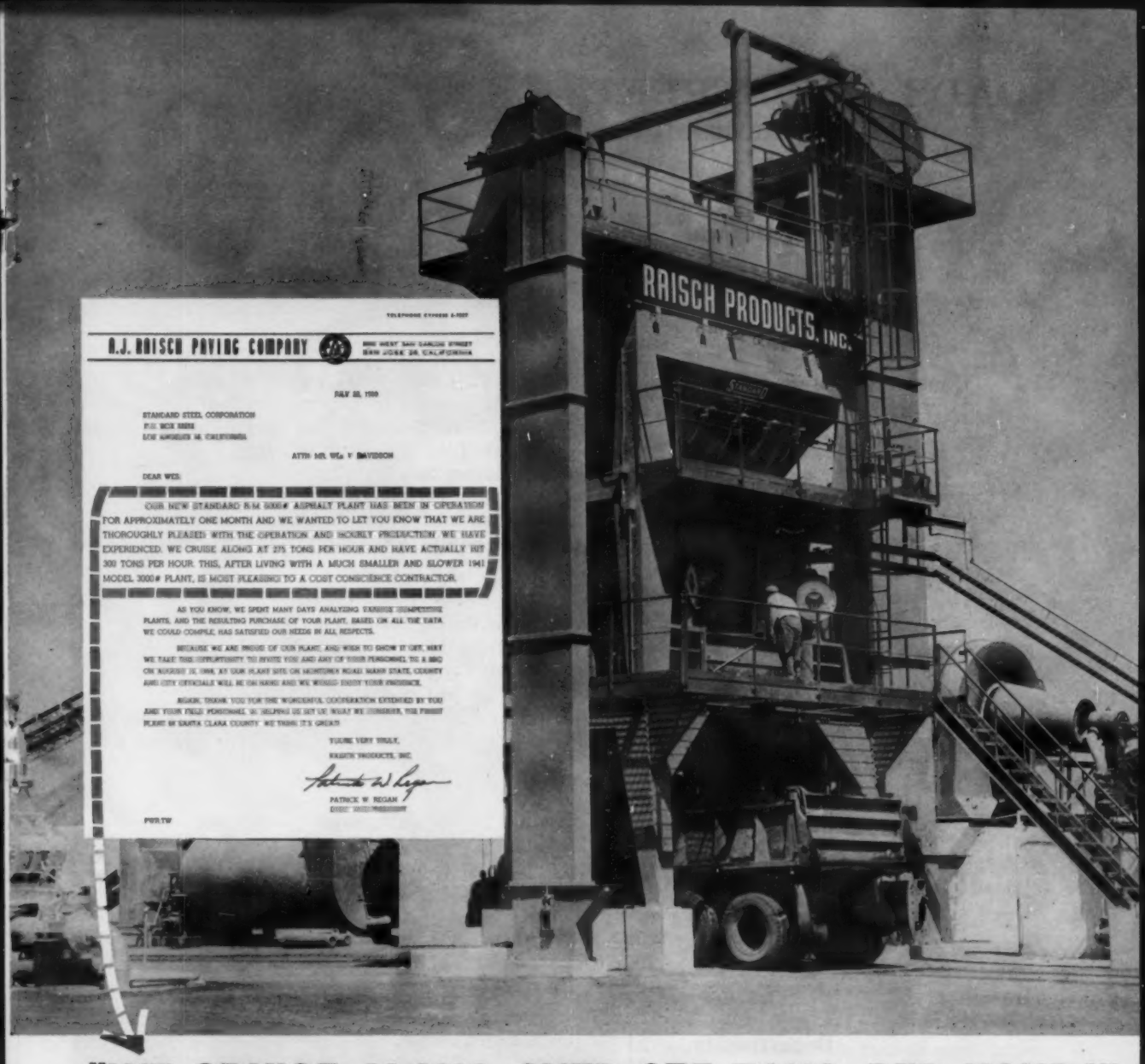

RAISCH PRODUCTS, INC.
A.J. RAISCH PAVING COMPANY
DEAR WES:
OUR NEW STANDARD R-M 6000# ASPHALT PLANT HAS BEEN IN OPERATION FOR APPROXIMATELY ONE MONTH AND WE WANTED TO LET YOU KNOW THAT WE ARE THOROUGHLY PLEASED WITH THE OPERATION AND HOURLY PRODUCTION WE HAVE EXPERIENCED. WE CRUISE ALONG AT 275 TONS PER HOUR AND HAVE ACTUALLY HIT 300 TONS PER HOUR. THIS, AFTER LIVING WITH A MUCH SMALLER AND SLOWER 1941 MODEL 3000# PLANT, IS MOST PLEASING TO A COST CONSCIENCE CONTRACTOR.
AS YOU KNOW, WE SPENT MANY DAYS ANALYZING VARIOUS COMPETITIVE PLANTS, AND THE RESULTING PURCHASE OF YOUR PLANT, BASED ON ALL THE DATA WE COULD COMPILE, HAS SATISFIED OUR NEEDS IN ALL RESPECTS.
BECAUSE WE ARE PROUD OF OUR PLANT, AND WISH TO SHOW IT OFF, WE'LL TAKE THIS OPPORTUNITY TO INVITE YOU AND ANY OF YOUR PERSONNEL TO A BBQ ON AUGUST 31, 1958, AT OUR PLANT SITE ON MONTEREY ROAD NEAR STATE, COUNTY AND CITY OFFICIALS WILL BE ON HAND AND WE WOULD ENJOY YOUR PRESENCE.
AGAIN, THANK YOU FOR THE WONDERFUL COOPERATION EXTENDED BY YOU AND YOUR FIELD PERSONNEL IN HELPING US GET UP WHAT WE CONSIDER, THE FINEST PLANT IN SANTA CLARA COUNTY. WE THINK IT'S GREAT!
YOURS VERY TRULY,
RAISCH PRODUCTS, INC.
PATRICK W. REGAN
PWR:TW

"WE CRUISE ALONG OVER 275 TONS PER HOUR!"

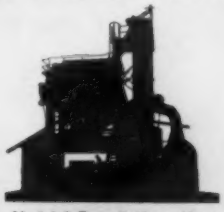
"Our new Standard R-M 6000 pound Asphalt Plant has been in operation for approximately one month and we wanted to let you know that we are thoroughly pleased with the operation and hourly production we have experienced. We cruise along at 275 tons per hour and have actually hit 300 tons per hour."

STANDARD ASPHALT PLANTS

STANDARD / Complete line of Asphalt Plants 2000 through 8000 pound capacity.

Model T-M • Trailer-mounted, self-contained.

Model R-M • Semi-portable and stationary



Model S-E • Self-erecting, fully portable.

STANDARD STEEL CORPORATION *Manufacturers of: Asphalt Plants • Rotary Dryers • Kilns • Coolers • Cryogenics*

GEN. OFFICES AND PLANT: 5003 BOYLE AVE., LOS ANGELES 58, CALIF. • MIDWEST OFFICES AND PLANT: DECATUR 03, ILL. • EASTERN OFFICES AND PLANT: LOWELL 03, MASS.

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ROADS AND STREETS APRIL, 1960

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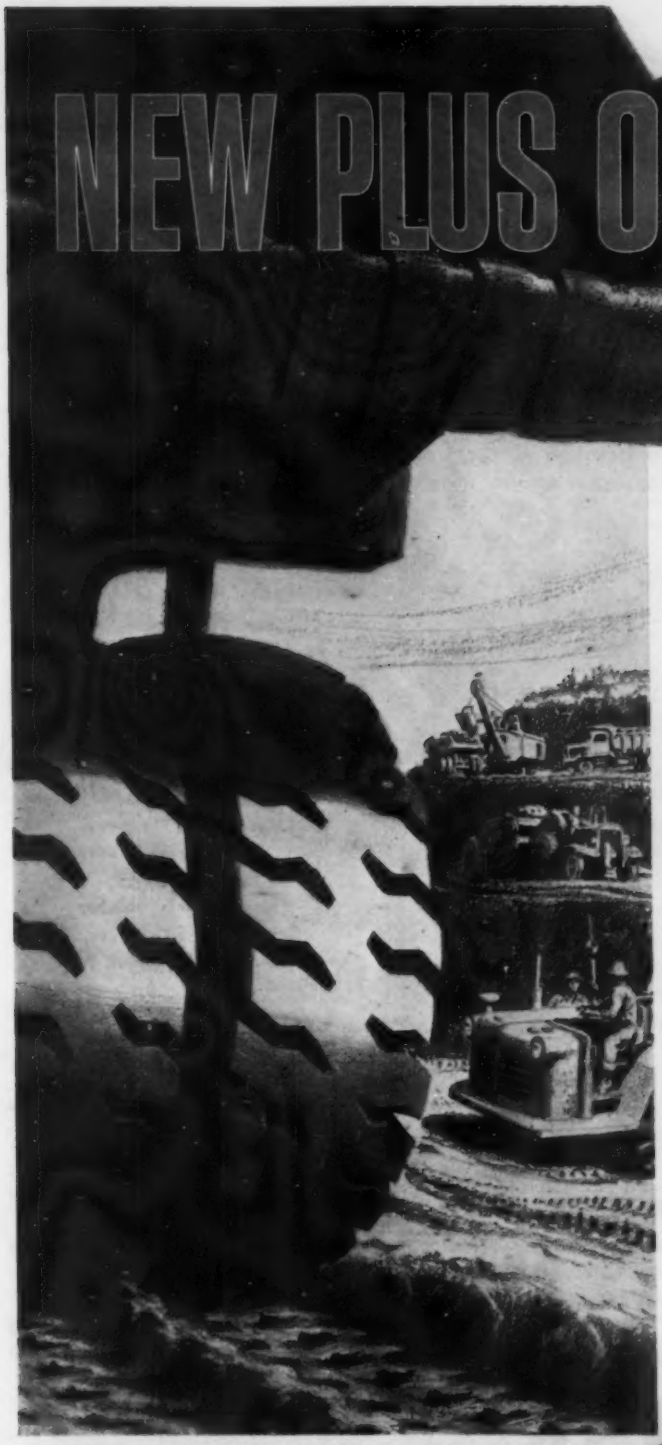
NEW PLUS ON PROFIT



Great new Goodyear tread cuts tire costs!

ON NEW SUPER ROAD LUG—a tougher tread utilizing advanced super-toughening agents mated to the toughest body known! This recently perfected tread compound matches the ruggedness of 3-T (nylon or rayon) Processed Cord! Result: an outstanding example of Goodyear's *toughest tires on earth!*

Now longer wear can reduce tire costs to build your profit. The bigger the job, the more you'll save with SUPER ROAD LUG on your wheels.

You'll find it keeping construction jobs going full blast, with its super traction rolling heavy equipment over the roughest ground, up the steepest grades and over smooth highways alike.

And new SUPER ROAD LUG takes the aggravated flexing caused by huge loads jouncing over rough terrain—thanks to its tough body built with 3-T (nylon or rayon) Processed Cord. This famous cord, triple-tempered by the exclusive Goodyear process involving Tension, Temperature and Time, has matchless strength and stamina.

Get onto the new performance and savings you'll have with this new super-tough SUPER ROAD LUG. Call your Goodyear dealer—or write Goodyear, Truck Tire Dept., Akron 16, Ohio.

THE WORLD'S TOUGHEST TRUCK TIRES BY

GOODYEAR

Road Lug —T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

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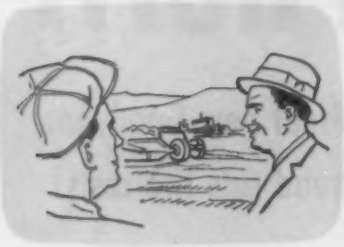
Bill Smith, contractor, speaks on used equipment!



"Take it from me, I've bought some real junk in used machines. Fixing 'em up and keeping them fixed used to be just one long headache.

"But now things are a lot different. When I buy used equipment, I buy from a Caterpillar Dealer.

"I've found Caterpillar used machines similar to new in more ways than one. They stand up better and are easier to keep working. And here's something else that's important . . .

"By keeping them in good shape, when I trade them back in, I get top dollar. I guess you could call that 'built-in' value!"

BONDED BUY

Your Caterpillar Dealer can give you the best used equipment buys in town. No other outfit offers you deals with this protection:

A "Bonded Buy" up to $10,000 on used Caterpillar equipment—your guaranteed assurance of satisfactory machine performance and on *all* parts of the machine during the guarantee period . . . and it includes labor, too. Also a "Certified Buy" and a "Buy and Try" class of machines that give you full value for the money.

You *know* what you're buying from a Caterpillar Dealer. He's listed in the Yellow Pages. Make his lot your first stop for used equipment.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

CATERPILLAR

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BEST BUYS IN NEW AND USED EQUIPMENT

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ROADS AND STREETS

Devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; the construction and maintenance of airports. Represents 68 years of continuous publishing in the highway field; combined with Engineering and Contracting and Good Roads Magazines, established in 1892.

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Rural Roads • Street Engineering
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Report on the all-purpose Cat No. 619 with No. 442 Scraper

"This rig has more features than anything we looked at in its class. More power, speed, maneuverability"

George Hudson, Construction Supt., Grant County, Wis.

To keep an 8 to 10 mile per year road building program on schedule, Grant County needed a fast, compact mobile earthmover for use on longer hauls and larger yardages. After testing competitive rigs, a demonstration sold the county on a Cat No. 619 with matching No. 442 Scraper. Reason: it has more "bonus features" than any other machine in its class.

First assignment for the No. 619—relocating a half mile of road to eliminate a bad curve. 14,000 cu. yd. had to be removed to make a 14-ft. cut. The job proved to be a stop-and-go affair—haul distance 375 ft.—with tough material—sand, rock and clay so stubborn that much of it needed ripping. The No. 619's lugging ability and easy handling on sharp turns pay off. And on longer hauls, Superintendent Hudson reports the No. 619 "climbs up a 5% grade in 4th gear with a good load."

Here are some reasons why the No. 619-No. 442 is an "all job" rig loaded with performance. A Turbocharged Cat Engine delivers 225 HP and high torque rise for fast acceleration and lugging power under capacity loads. The LOWBOWL Scraper handles 14 cu. yd. struck . . . 18 cu. yd. heaped. The No. 619-No. 442 team has 30 MPH *usable* operating speed . . . hugs the ground for roadability found in no other 2-wheeled earthmover of its capacity. Newly developed 2-jack hydraulic steering gives effortless maneuverability yet retains "feel of the road" control. This advance steering permits full 90° turns in a diameter of 30 ft.

Get the full story on this hurry-up, all-purpose rig from your Caterpillar Dealer. Ask for a demonstration under the job conditions you face. See how you can make use of its versatility to step up production on your job.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

CATERPILLAR

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NO. 619-NO. 442
FOR "ALL JOB" VERSATILITY

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You and UNIT earning power

Completely satisfied with the performance record of his two UNIT ¾ YD. excavators, Mr. James Lavin of JFL Trucking and Excavating, West Allis, Wis., says he'll pick UNIT again when buying a new machine.

Buying major construction equipment is almost like marriage — you'll live with your choice a long time. That's why it's important to choose the bigger *earning power* of a UNIT excavator or crane. You'll find that your equipment investment will pay off with fast cycle speeds, big output and more dependable performance than other machines in the same size range. You and your UNIT will have a true *payload partnership.*

Fast work on the job — lowest operating cost — negligible downtime . . . these are but some of the reasons why the *earning power* of a UNIT lets you knock out the competition at bid letting time. You win more contracts with a combination of job-proved features, finest quality components and unmatched workmanship.

Features like UNIT'S exclusive one-piece cast main machinery gear case that completely encloses all gears and shafts in a constant bath of lubricant . . . eliminating frequent adjusting or greasing. UNIT offers straight-in-line mounting of the engine with the main machinery to give longer machine life and perfect alignment of all working parts. All disc-type operating clutches are interchangeable . . . can't grab or self-energize. The exclusive automatic traction brakes on crawler machines assure positive, safe braking power . . . even on the steepest grades. Long, wide-spread crawlers and a big, heavy carbody provide the solid working base you need to get full dippers in the toughest material.

You can start on the road to your *payload partnership* right now by calling your UNIT dealer. He's got the detailed information you need on the 5 UNIT convertible crawler machines, 4 UNIT convertible truck cranes and 2 UNIT mobile cranes.

SHOVELS	HOES	CRANES	DRAGLINES
½ to ¾ YDS.	½ to ¾ YDS.	5½ to 40 TONS	½ to ¾ YDS.

UNIT

UNIT CRANE & SHOVEL CORP.

6407 W. Burnham Street
Milwaukee 19, Wisconsin

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Only the "GENUINE" can deliver what you have a right to expect

Only genuine Eaton Service Parts match the original production axle components in design, metallurgy, heat treatment, and quality of finish. Only by using genuine Eaton parts can you be sure that the newly installed units will deliver the same dependable, low-cost performance.

After many thousands of miles of service, even Eaton Axle components may require replacement. When this happens, be sure to specify that repairs be made with genuine Eaton Service Parts—it will pay out in extended axle life and freedom from schedule interruptions.

More than Two Million Eaton Axles in Trucks Today

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AXLE DIVISION
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You can see
it's Pacal

T.M. Reg. U.S. Pat. Off.

Buy Pacal Heat Treated Plow Bolts, too. They have triple strength and hardness. They will not loosen or stretch and heads will not wear off. Especially developed to provide the longer wear required by Pacal X-TRA-EDGE BLADES.

Also available
⅞" heavy duty section
with ⅝" top

P&C

PAPER, CALMENSON and Company

BLADES

the popular choice

County Highway Official, Iowa—"After one year's use new Pacal blades have saved our county 40 to 50% in blade and bolt costs."

County Highway Engineer, Iowa—"Special hardened blades very satisfactory here. Switching to this three-piece arrangement 100%."

County Highway Official, Minnesota—"380 hours on machine before blades were worn out."

County Highway Superintendent, Indiana—"Results very good . . . getting 4 times the wear over old 5/8" x 6" double bevel curved-blades."

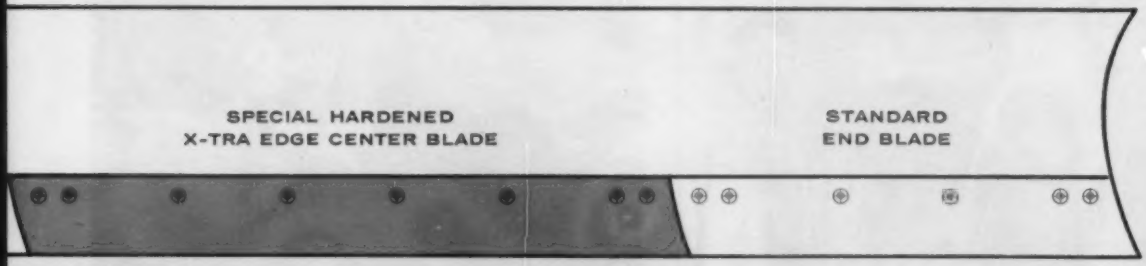
County Highway Official, Iowa—"Very pleased with new three-piece blade . . . receiving four times the wear of blades previously used."

State Highway Engineer—"Have used 15 sets of 1/2" to 3/4" x 8" blades. They wear very straight and 50-60% longer than 1/2" x 8" blades."

County Highway Official, Missouri—"Pacal 1/2" to 3/4" x 8" special hardened blades giving about 5 times more wear than 1/2" x 6" blades."

County Highway Superintendent, Ill.—"Using 1/2" to 3/4" x 8" blades and know they outlast 5 to 6 pairs of 1/2" x 6" double bevel curved blades."

City Street Commissioner, Missouri—"Three-piece 5/8" to 7/8" x 8" hardened blade wearing 5 to 6 times as long as 1/2" x 6" double bevel curved blade."



Profile of Pacal X-TRA-EDGE BLADE shows how you can get more steel on the wearing edge with no increase in waste. New Pacal hardened center section resists crowning, makes your blades wear two to six times longer, cutting blade costs even more. Join the number of satisfied users—write or call Pacal!

ALL STEELS FURNISHED BY PACAL MADE IN U.S.A.

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Telephone Midway 6-9456 • Branches in Duluth, Minn. and Billings, Mont.

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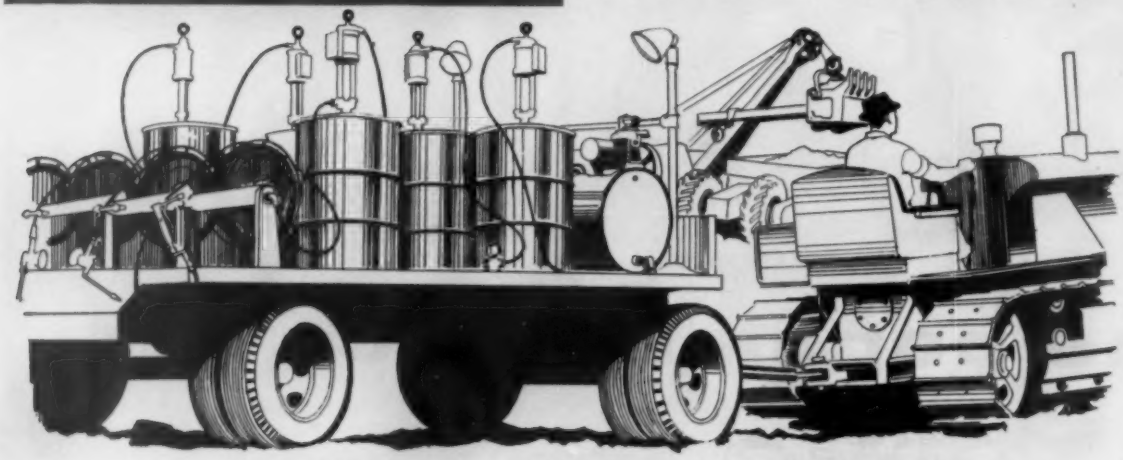
CIRCULAR 889

LUBE LOGIC Tips for more



Do-it-yourself lube rig trailer

Maybe you're aware of all the advantages of a mobile lube rig, but just don't want to tie up a truck for this purpose. Or, perhaps you'd like a supplementary rig. You can solve either problem neatly by mounting your field lubricating equipment on a standard 5-ton farm trailer. That way, you can take your whole simplified lube plan out into the field where it's needed, without costly deadheading back to a fixed service point—and you can move the lube rig just by hitching it to any truck, so it's just as mobile as a truck mounted rig at much less cost. And here's a bonus: by hitching your lube rig trailer to a bulldozer, you can take field service to spots that wouldn't be accessible to a regular truck.

Trailers for this purpose, as well as tanks and pumps, are all standard items you assemble yourself to meet your own requirements.

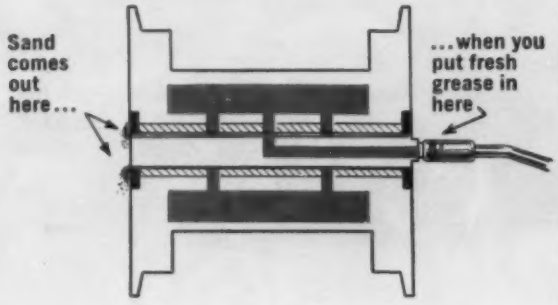
TEXACO LUBRICATION ENGINEERS ON THE JOB FROM COAST TO COAST

ROCKY REACH DAM AND POWERHOUSE on the Columbia River, Washington (above). W. N. Evans (left), Manager for Rocky Reach Contractors, discusses Simplified Lubrication Plan with E. S. Saunders, Texaco Contractor Sales Representative.

HOGBACK DAM, Riverton, Conn., (upper right) is part of the greater Hartford water supply system. Texaco man-on-the-job is H. F. Porter (left) shown with John Toffolon, Vice President, White Oak Contractors, Inc., General Contractors.

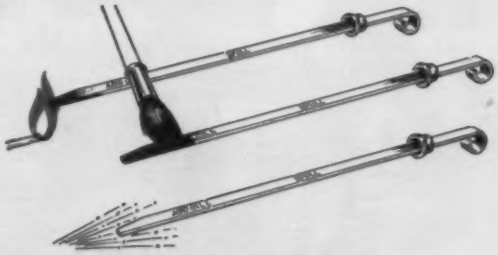
INTERSTATE HIGHWAY 80 PROJECT at Colfax, Iowa (right). Texaco Engineer E. A. Howles (right) works closely with Mott Construction Company on the important assignment of keeping equipment on the job and maintenance costs low.

efficient maintenance



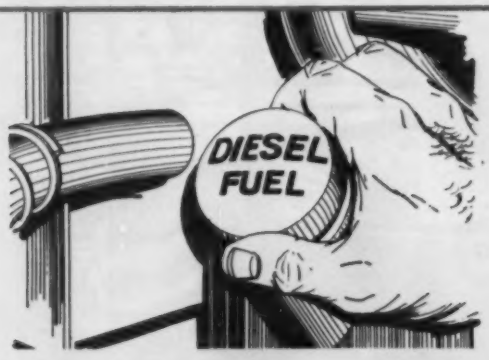
Track-roll enemy No. 1: sand

If you're operating a crawler-tractor in sandy soil, the best way to keep sand from getting into the track-roll bearings is to keep purging the bearings with fresh grease. Track-roll bearing seals are especially designed for this type of purge-lubrication, and the grease that comes out around the edges of the seal during lubrication carries the sand out with it.



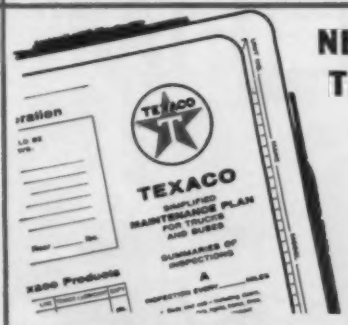
How to read dipsticks without squinting

The modern inhibited motor oil that keeps the inside of your engine clean also keeps the oil dipstick clean—and often too shiny to read. Here are three solutions for this problem—take your choice. 1. Heat the end of the dipstick so the metal darkens slightly. 2. Paint the end of the stick with a dull-finish cellulose lacquer. 3. Run the stick across the spark-plug cleaner to take off some of the shine. (If you use the spark plug cleaner, use the smallest rubber plug bushing and hold the dipstick over the hole with a wad of cloth to keep sand from scattering around the lube bay.)



Identify the fuel you want

Let one absent-minded maintenance man put gasoline in your diesel tank and as the fliers say "you'll be bailing out over Denver." It's happened. Best way to avoid its happening to *you* is to mark your fill cap "Diesel Fuel" or "Gasoline". Then nobody should make any mistakes.



NEW TRUCK RECORD FOLDER fits itself into your schedule

Texaco's flexible new truck record folder lets you stick to the lube schedule that works best for you without running into bookkeeping problems. Lubrication and oil schedules are completely separate from mechanical maintenance and replacement parts schedule—you don't have to follow any pre-established routine to use the folder profitably. And this new folder accounts for every single dollar you spend on truck maintenance for a whole year. Write for your folders today.

TEXACO LUBRICATION ENGINEERS

Every month we'll bring you a batch of "sleepers", little angles, so easy to overlook, where big savings in money and time can be made. But month in, month out, your local Texaco Lubrication Engineer is the best source of money-saving lubrication ideas. Don't forget that "Lubrication is a major factor in cost control."

Texaco Inc., 135 East 42nd Street, New York 17, N.Y.

Tune In: Texaco Huntley-Brinkley Report, Mon. Through Fri.-NBC-TV

TEXACO

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Six-passenger capacity, plus pickup body—the Travelette® takes work crews and their equipment all in one trip. Comfortable, full-width rear seat has curbside door for easy in and out. Chassis and 6-ft. standard or Bonus-Load pickup body are factory matched and factory mounted. Travelette models handle gross loads up to 8,800 lbs. You get "dual versatility" for one price. Optional four-wheel drive.

Tailor-made for hard work and heavy loads, INTERNATIONAL **stake models have heavy-duty brakes and springs for long life on rough jobs. Wide cab seats three men comfortably. True-truck V-8 engines up to 197 hp. move loads faster, with welcome gas economy. Choice of regular or all-wheel drive, factory-installed stake bodies from 8 to 16 ft. long. Models up to 33,000 lbs. GVW.**

"Hotshot" small loads, big men around the job in an INTERNATIONAL pickup. Comfortable cab has 5 ft. wide seat, extra headroom. Choice of standard all-steel bodies (shown) or optional Bonus-Load bodies up to 8½-ft. long. 266 cu. in. V-8 engine gives outstanding gas mileage. Sweep-Around windshield has no "knee-skinning" doorway projections. Four-wheel drive available, too.

INTERNATIONAL HAS WHAT IT TAKES

in pickups...in stakes... in any truck you need!

Here are three reasons for you to think of *and look into* INTERNATIONAL when you want light and medium-duty trucks that do many jobs well over many years.

They're three from dozens of INTERNATIONAL models designed to take more people, more payloads, more punishment. In these trucks — as in all INTERNATIONALS—*every* component is a *truck* component, built for long life and low-cost maintenance. True-truck V-8 engines are standard power, with famous INTERNATIONAL 6's optional. You can't beat 'em for ruggedness, solid comfort, easy handling — and for dollar value.

Next time you're in the market for trucks, take a look at everything INTERNATIONAL has to offer. See your INTERNATIONAL Truck Dealer or Branch.

INTERNATIONAL® TRUCKS WORLD'S MOST COMPLETE LINE

International Harvester Company, Chicago • Motor Trucks • Crawler Tractors
Construction Equipment • McCormick® Farm Equipment and Farmall® Tractors

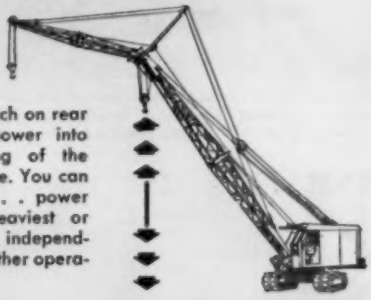
". . . for more details circle 333 on enclosed return postal card

Only with LINK-BELT SPEEDER Full-Function Design...

perform up to 6 operations

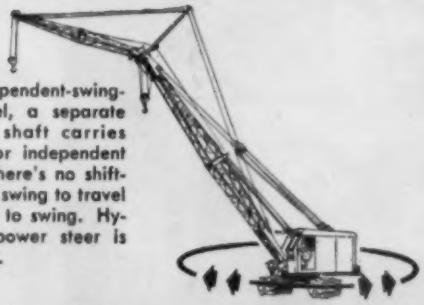
simultaneously or

1 POWER UP OR DOWN MAIN LOAD LINE

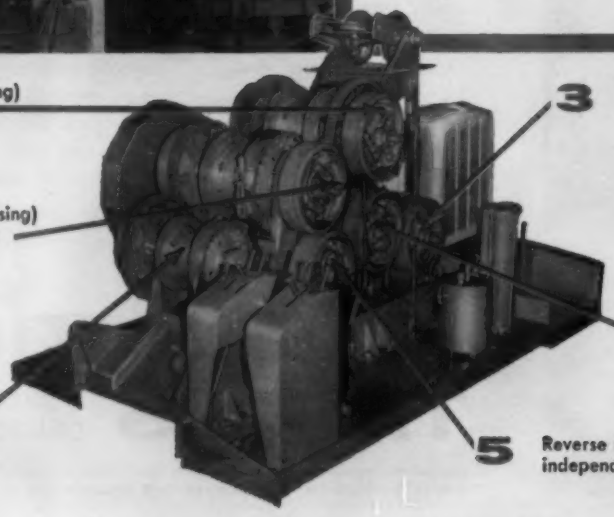


Reversing clutch on rear drum puts power into load lowering of the main hoist line. You can power up . . . power down the heaviest or lightest loads independently of all other operations.

4 SWING RIGHT OR LEFT



With independent-swing-and-travel, a separate reverse shaft carries power for independent travel. There's no shifting from swing to travel or travel to swing. Hydraulic power steer is standard.



1 Load lowering (reversing) clutch for rear drum

2 Load lowering (reversing) clutch for front drum

3 Boom lowering clutch

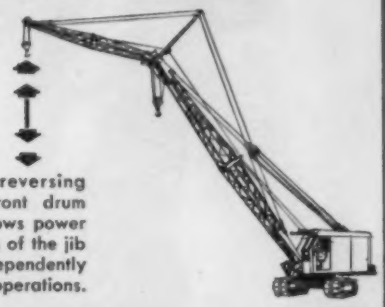
4 Reverse shaft for independent swing

5 Reverse shaft for independent travel

6 Independent third drum

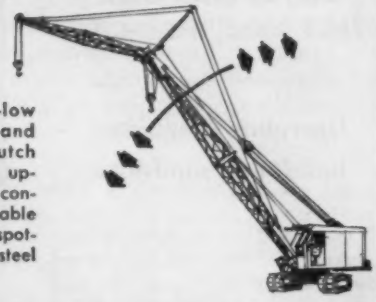
independently!

2 POWER UP OR DOWN SECONDARY LOAD LINE



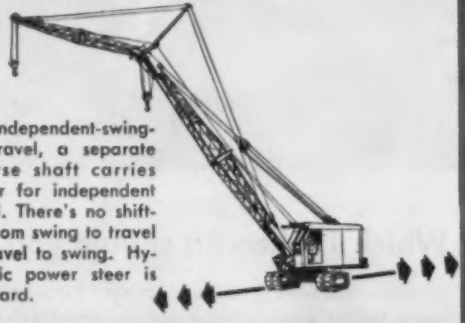
Exclusive: a reversing clutch for front drum also . . . allows power load lowering of the jib whip line independently of all other operations.

3 HOIST OR LOWER BOOM UNDER POWER



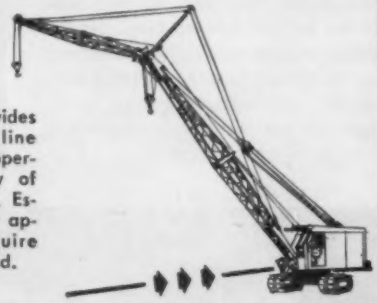
Independent high-low speed boomhoist and boom lowering clutch provide fast, safe up-and-down booming control. Especially valuable for high-accuracy spotting jobs such as steel erecting.

5 TRAVEL FORWARD OR BACKWARD



With independent-swing-and-travel, a separate reverse shaft carries power for independent travel. There's no shifting from swing to travel or travel to swing. Hydraulic power steer is standard.

6 OPERATE INDEPENDENT THIRD DRUM



A third drum provides one more load line which, again, is operated independently of all other functions. Especially useful for applications that require "snaking" in a load.

Link-Belt Speeder's years-ahead Full-Function Design is standard on all models up through the 40-ton "108" Series. Because of this exclusive design concept, your operator can have completely independent control of *all* lifting or excavating applications. He can power individual load lines up or down, crowd or retract, swing and travel, boom up or down — all individually, or in any combination, depending on the job.

And only those components he puts in use are under load; all others revolve freely on anti-friction bearings. This design practically *doubles* machinery life. Get the complete Full-Function Design story from your distributor. Or, write LINK-BELT SPEEDER CORPORATION, Cedar Rapids, Iowa. 106-60N

LINK-BELT SPEEDER

It's time to compare . . . with Link-Belt Speeder

. . . for more details circle 346 on enclosed return postal card

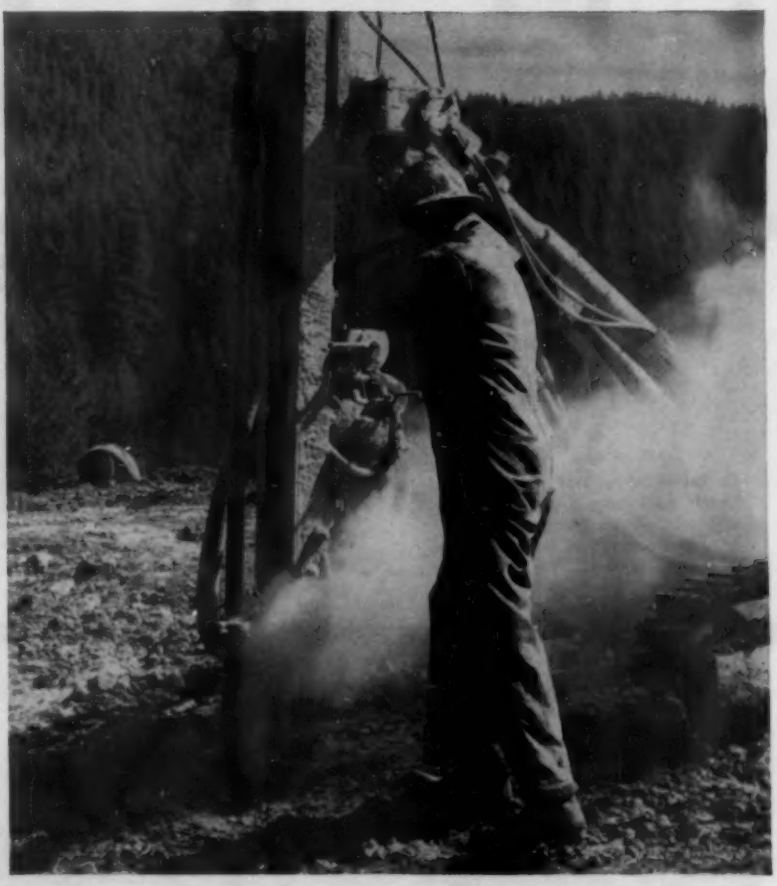
"WE DRILLED 300′ TO 500′ PER REGRIND . . . GOT 10 TO 12 REGRINDS PER BIT WITH TIMKEN® CARBIDE INSERT BITS"

Special report from
Henry J. Kaiser Co. and
Raymond International, Inc.

LOCATION: HOWARD A. HANSON DAM, ON GREEN RIVER, EAGLE GORGE, WASHINGTON

Operating conditions: basalt and sandstone

Here's another project where Timken® carbide insert bits proved their exceptional long life and fatigue resistance. In construction work at the Howard A. Hanson damsite, Henry J. Kaiser Co. and Raymond International, Inc. used 143 drills. The drilling rate was 24″ to 36″ per minute. Hole depths drilled ran up to 40′. With Timken carbide insert bits, they drilled 300′ to 500′ per regrind, got 10 to 12 regrinds per bit—made important savings in drilling costs.



Which Timken Bit should you use?

In hard, abrasive ground, use the Timken carbide insert bit for greatest economy. In softer ground, use the low-cost Timken all steel multi-use bit. Both bits are interchangeable in the same thread series; you can switch bits as the ground changes. Dozens of different Timken bits fit the same drill steel. And both types are made from Timken electric furnace fine alloy steel, have special shoulder unions to protect threads against drilling impact. Let us help you select the Timken bit best suited for your job. The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.*

TIMKEN®

removable rock bits

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ROADS AND STREETS
Sixty-Six Years of Editorial Leadership

Washington News Letter

By Duane L. Cronk, Director, Highway Information Services, Inc.

April 10, 1960

A revival of the conflict over application of the Davis-Bacon Act to road building flared up in Washington last month as both the U.S. Chamber of Commerce and the AFL-CIO vowed to push their respective arguments anew. The federal labor law, which has been applied to highway construction for just three years, is boosting the cost of road work unreasonably, the Chamber declared, and ought to be thrown out the window. It wants outright repeal of Davis-Bacon as an "archaic and outmoded" measure drafted during the depression to maintain minimum labor rates on federal-aid work but no longer necessary in this day of high construction industry wages.

The Act requires that the U.S. Department of Labor make a determination of the wage rates prevailing in the area of a new project and to force successful bidders to pay those rates. Wilful non-compliance may lead to "black-balling" - a refusal to permit the offender to bid on other federal-aid work for three years. The Act was applied to projects only on the Interstate System in 1956 and since then the state highway departments, the Bureau of Public Roads and the Department of Labor have cooperated closely to obtain strict compliance.

* * *

The Chamber charges that the Labor Department, in making determinations of the prevailing wages, often applies the union wage scale (even though the project may be in non-union territory) and the higher urban area scale (even if the job is miles away in rural area). "Local wage patterns are upset, making it possible for high cost union construction crews to get the job," the Chamber claims. "The net result . . . is to put union wage rates into all government construction contracts."

The economic impact of Davis-Bacon on Interstate projects was revealed through a survey taken by the Arkansas Chamber of Commerce, now being publicized by the national office to document its arguments for repeal of the Act. The organization polled all of the state highway departments to ask if fixing of prevailing wages had increased construction costs. Fifteen states replied that the law had exerted little influence; seven said they could determine no effect; and 18 reported that Davis-Bacon was a definite factor in increasing project costs.

In the latter instances, the state engineers estimated, the increases ran from 3% to 25%. Labor leaders here say such wage raises were to be expected in the highway industry, segments of which have not been highly organized or subject to compliance with the federal law prior to 1956.

Meanwhile, contractors are complying conscientiously, whether they like it or not, enforcement officials in both the BPR and the Department of Labor admit. In fact, both sources declared that not one roadbuilder has been "black-listed" for

(continued on next page)

wilful failure to pay his men the predetermined wage rates. BPR Attorney Arthur Walters said: "It is a rare contractor who will wilfully violate the Davis-Bacon Act. There have been a very, very few honest misjudgments of classifications, which is understandable. A contract comes into a new geographical area and finds that iron workers handle certain jobs that he had assigned to carpenters on his previous project, and the result is a failure to comply that has to be reported. We don't recommend legal prosecution in such cases, of course."

The Chamber of Commerce is prepared to take five years, if necessary, to win repeal of Davis-Bacon. A special committee is soliciting cases where construction costs have been boosted significantly by application of the Act. It cites one example in Nebraska where, on the Hastings airport, bulldozer operators were given $2.80 per hour although the local rate was only $1.75, and metal pipe layers got $2.30 instead of $1.60. Protests from contractors forced the Labor Department to reconsider.

* * *

The unions have no intention of backpeddling away from this major victory. In fact, they have put the heat on Congress to strengthen the Act immeasurably. The building and Construction Trades Department of the AFL-CIO is pushing for passage of bills in both the Senate and the House which would force the inclusion of fringe benefits in Davis-Bacon wage determinations and extend the law to cover all federal-aid highway projects. Specifically, these proposals would:

- Put all road and airport construction under the Davis-Bacon Act, on projects in excess of $25,000 value and financed at least one-third by the federal government.

- Require that the predetermination of wages in an area include not only direct hourly rates but also contractor payments to health and welfare funds, retirement funds, vacation and apprenticeship funds.

- Require contractors to pay the prevailing over-time rates for each construction craft on a daily, as well as the weekly basis. In addition, contractors would be required to pay a minimum over-time scale for hours worked over eight per day.

The AFL-CIO argues that 65% of the industry is covered by negotiated health and welfare plans, anyway, and it is really doing the contractors a favor by eliminating the low-wage competition.

* * *

Contractor representatives put up a good fight against another Congressional measure - one which would lift the ban on secondary boycotts on construction jobs. AGC officials from Indiana, Florida, Texas, and Wyoming were given an opportunity to argue against the proposal in hearings held by a subcommittee of the House Labor and Education Committee. Even though most of the witnesses during the two-week session opposed the bill, the group voted 5-3 to recommend its passage. The full committee will probably have acted by the time this is read.

Under Secretary of Labor James O'Connell maintained that by the nature of relationships between all contractors on a single construction site, none could validly claim to be an "innocent third party." And the Taft-Hartley ban on secondary boycotts in construction unfairly reduces the right of these workers to strike, he said.

AGC's Frank Rooney declared the bill would encourage strikes, weaken the police power of responsible international officials, stimulate all manner of minor disputes, and inject new hazards into the industry would be bound to increase construction costs. Such considerations may receive better attention in the full committee.

Other major Washington developments . . .

A compromise ABC bill was OK'ed by the House Public Works Committee last month after a series of hearings on the regular two-year authorization measure. The bill would freeze the federal contribution for Primary, Secondary and Urban Systems to $925 million per year during fiscal 1962 and 1963. The committee drew a line between conflicting demands for a cut-back and a boost. The Administration wanted the sum held at $900 million annually. The American Association of State Highway Officials wanted $950 million in '62 and $950 million in '63.

Roadbuilders testifying before Congressman George Fallon's Subcommittee on Roads pointed out that highway construction costs are remaining almost constant in spite of inflationary pressures. Harold L. Plummer, of Highway Management Associates, speaking for ARBA, said that new roads would probably never be cheaper than today. Max Harrison, Pittsburgh contractor speaking for AGC, noted that average hourly earnings of workers on road projects rose 33% between 1953 and 1959; material prices climbed 20%; and equipment ownership costs, 24%. But bid prices inched upward only 2.7%.

In fact, contractors in this country can handle $18 billion worth of highway work, AASHO told the committee. President David H. Stevens reported that a survey of state highway departments last month revealed that they have prequalified contractors to handle that much work. But they are currently working at only 15-25% of that capacity. In replying to the AASHO poll, states based their capacity estimates on contractor capital, equipment, and experienced personnel. A rule of thumb is that good prices may be obtained to the point where contractors are working at 60% of capacity, Mr. Stevens said. This may explain why bidding has been so competitive and prices so stable for many months.

* * *

Equipment manufacturers and distributors are highly disturbed over a bill which would encourage the return of surplus construction equipment to this country from government "dumps" overseas. There are "acres and acres" of unused units left over from World War II, the Korean War, and subsequent military purchases, federal officials say. The domestic market has been protected heretofore by a requirement that the Department of Commerce must prove there is a serious shortage of equipment here. A bill pending now, however, would change this provision and only make it necessary for importers to show that such importation would not be injurious to the economy of the country.

Some interesting facts about the construction equipment industry were produced in testimony by Robert P. McKenrick, executive vice president of CIMA. Mr. McKenrick said that American producers are not operating at anywhere near their capacity of $3 billion worth of equipment per year. (Shipments last year totalled only $1.8 billion.) Present production schedules are cut back to 60% of plant capacity and there is some $500 million worth of new and used equipment available in manufacturers' and distributors' warehouses.

* * *

The long-looked-for federal policy on transportation was released last month. It will have considerable influence on future attitude of the Administration toward relative merits of highway and rail transportation and will undoubtedly affect the prospects of the long-range highway construction program. This will be reviewed in next month's issue of Roads and Streets.

(continued on next page)

Special "Roads and Streets" Newsletter Report

AGC CONVENTION SESSION PUTS ROAD PROGRAM "UNDER CAMERA"

The cameras literally were trained on the highway program one morning last month in San Francisco. A panel review on this subject was staged and recorded for later TV release, as part of the all-morning highway session of the Associated General Contractors of America 41st annual convention. This dramatized appraisal moderated by AGC's president-elect John A. Volpe created a valuable new educational film. And it drew fresh attention to the many ways in which highway contractors today are taking part in the affairs of their industry.

Panelmen under the floodlights were Congressman Gordon H. Scherer, House Sub-Committee on Roads; Bertram D. Tallamy, Federal Highway Administrator; A. E. Johnson, Executive Secretary of AASHO; and Randolph Collier, state Senator in California. By throwing a fresh perspective on the reasons why the federal highway program has run into difficulties, this panel performed a valuable service.

Advocates of better highway legislation at the state levels were given important ammunition by panelman Collier. He told the ingredient's of California's highway leadership: documentation of highway need, thorough grass roots education, wise tax legislation, early passage of a controlled access law, a revolving fund for advance right-of-way acquisition (has saved a hundred million). And - most important - long range planning and legislative continuity.

* * *

Elsewhere at the all-morning highway session, delegates took up pressing problems, considered some of their Association's accomplishments:

- AGC representatives have continued to play an important role in presenting the highway story in Washington, noted J. M. Sprouse, AGC's highway manager.

- The AASHO-AGC joint cooperative committee was credited with important success in such matters as end-result specifications, more prompt payments by highway departments, easement of restrictive rules on equipment transport, and other matters affecting contractor performance. Co-chairman W. A. Bugge of AASHO and contractor members urged greater use of state cooperative committees, and more vigorous follow-through with the highway departments to get desirable specification changes.

- The legal status of the truck owner-operator continues to alarm the industry. The Labor Department has shown little disposition to relax its ruling that such men be classed as employes, subject to the full red tape. Full enforcement would bring a chaotic turn and add substantially to costs, delegates reiterated.

- Should the 50% rule be relaxed in federal-aid highway subcontracting? Delegates voted "No" after a North Carolina delegate pleaded for approval of an easement. His state's holders of package contracts with complex urban work would gain, he said. Too much of a Pandora's box, others thought.

- Get behind the new Better Highways Information Foundation, urged M. Clare Miller, AGC vice-president-elect. He told the delegates that contractors in certain states have quickly voted large sums to help toward the $350,000 needed for the first year.

B.F.Goodrich develops 2 new long-wear tire compounds

B.F.Goodrich Cut Protected and Heat Resistant compounds boost tire life, cut costs on heavy construction and earth-moving jobs

THE most costly tire-killers on construction projects are either rock cuts or heat build-up. A B.F.Goodrich research team went to work on the problem, tested and researched various compounds, then developed the first truly Cut Protected and Heat Resistant compounds on the market.

Cut Protected compound gives longer service on jobs where:
- Rock cutting, chipping and abrasive wear are severe.
- Round-trip hauls are short.
- Trucks travel at low speeds.

Heat Resistant compound defies heat build-up on jobs where:
- Haul roads are well maintained.
- Trucks travel at high speeds.
- Cutting and chipping are at a minimum.

Tests show these compounds outperform any others available today. Ask your B.F.Goodrich dealer about them—find out how they can save *you* money.

HERE'S UNRETOUCHED PROOF of how the new B.F.Goodrich Cut Protected compound wears longer. Both tires were in service at the same time on identical jobs under identical conditions. Yet the Cut Protected compound tire above has given *approximately 3 times more service* than the tire below. Note how little the Cut Protected tread is worn.

SCRAPER HAULS 35 TONS OF CLAY AND SAND to grade new Interstate Highway No. 1202-(1)-9 in Conecuh County, Ala. Equipment works 60 hours a week on stop-and-go runs of a mile or less. Here's a job for the new B.F.Goodrich Cut Protected compound. On long, high-speed hauls, you'd choose the new Heat Resistant compound.

More highway construction news from B.F.Goodrich ▶

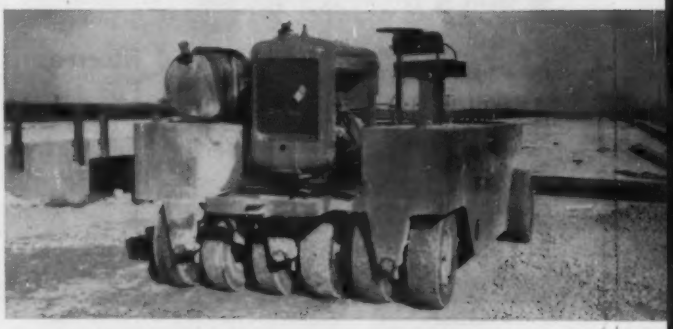
RUSHING HIGHWAY CONSTRUCTION near Lackland Field, this giant Killian-House scraper is loaded with 30 tons of earth. Tires are B.F.Goodrich Rock Service Tubeless, designed with massive double-chevron cleats for extra traction, forward or reverse. Rock Service tires are available in the new Cut Protected compound that defies rock cuts and snags, in the new Heat Resistant compound that withstands dangerous heat build-up, or in the Regular compound for normal service.

How long-wear B.F.Goodrich tires

HYDRAULIC DUMP TRUCK deposits asphalt to pave highway 25 miles southwest of San Antonio. Front tandem tires are B.F.Goodrich Power Express. Rear tandems are Traction Express on 4th retread. B.F.Goodrich FLEX-RITE NYLON cords withstand double the impact of ordinary materials, resist heat blowouts and flex breaks. That's one reason why Traction Express tires can be retreaded again and again.

B.F.GOODRICH ON-THE-JOB SERVICE helps contractors cut costs to a minimum. Servicemobile is equipped with all the latest power tools, including hydraulic cranes, bead jacks and pneumatic wrenches. B. F. Goodrich Tire Service Men handle any type tire on any type equipment, work quickly and efficiently. Best of all, B.F.Goodrich Tire Service Men are there when you need them.

6,000-GALLON WATERWAGON rolls on B.F.Goodrich Earth Mover tires. Note the unusual "button" tread. Hundreds of sharp edges bite into the ground to keep the tire from skidding or slipping. Yet the Earth Mover's wide tread keeps the tire on top of soft soil. Work stays on schedule.



HELPING COMPACT EARTH is the job of the 13 B.F.Goodrich smooth-tread tires on this road roller. Other Killian-House equipment includes 30 flat bed and water trucks, 10 scrapers, 15 maintainers, 30 pickups and 30 hydraulic dump trucks—all on B.F.Goodrich tires.

KILLIAN-HOUSE RELIES on B.F.Goodrich truck and trailer tires to move 200 amp. welding machine to equipment repair jobs. Altogether, this contractor uses nearly 800 B.F.Goodrich tires to help speed highway construction in Southwest Texas.

keep highway construction on the go

KILLIAN-HOUSE, one of the biggest highway and bridge construction companies in Texas, operates out of headquarters in San Antonio—maintains three field offices with 2-way radio hook-up to help service jobs currently worth more than twelve million dollars.

Every day a fleet of 143 units goes to work on B.F.Goodrich tires—scrapers on Rock Service tires, dump trucks on the Traction Express, maintainers on Power Grader tires, water trailers on Super Traction tires, pickups on the Power Express—even company cars on B.F.Goodrich Life-Saver Tubeless tires.

Why this vote of confidence in B.F.Goodrich? "Because," says General Superintendent Glen Quick, "they are the best tires for the job. For example, we once got only 30,000 to 50,000 miles from truck tires. Costs were enormous. Now B.F.Goodrich Traction Express tires give us 60,000 to 90,000 miles, cutting our costs in half."

Why not have a talk with your B.F.Goodrich Smileage dealer. He has long-wear tires for every type of off-the-road work and tire service that keeps construction on the go. Look under Tires in the Yellow Pages of your phone book. *The B.F.Goodrich Company, Akron 18, Ohio.*

SPECIFY B.F.Goodrich Tubeless or tube-type tires when ordering new equipment

OFF-THE-ROAD TIRES BY B.F.Goodrich

. . . for more details circle 327 on enclosed return postal card

Front Cover Scene

Maid-of-all-work on the front cover this month is a Hough Model H-90 Payloader, seen working around the sand and gravel plant of contractor Ernest R. Fyfe, of Wakefield, Kansas. Over 3,300 tons per day of clay and gravel base mixture was supplied to the firm's US 40 highway project near Junction City, Kansas.

Sand and gravel were pumped from the river by two 8-in. discharge centrifugal pumps on barges. Material was fed to mixers and classifiers by two draglines, then dropped into a storage hopper for loading into trucks. An International TD-20 dozer shoved material to the draglines.

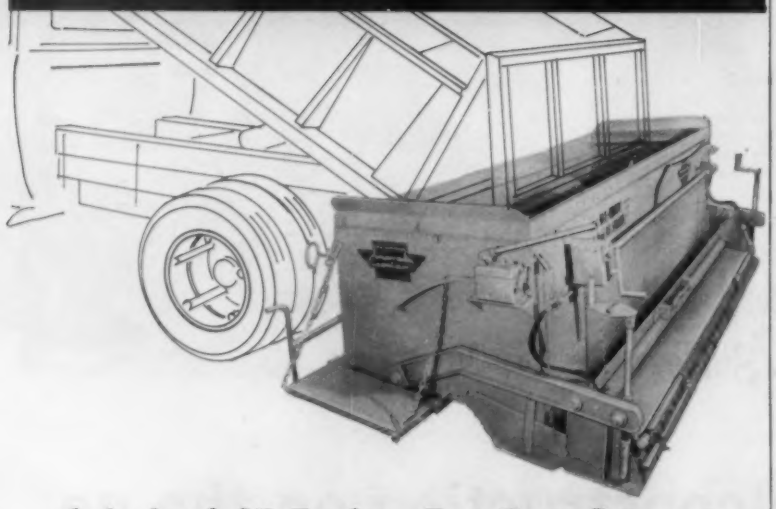
The Hough loader carried clay binder from stockpiles to one small dragline which fed the mixer. The mixer was an Eagle unit, powered by an International UD-24 engine.

Electronic Computer For College Use

Establishment of a computer laboratory for civil engineering students—first of its type in the nation—has been announced by Dr. John B. Wilbur, head of the Department of Civil and Sanitary Engineering at the Massachusetts Institute of Technology, Cambridge. In cooperation with the International Business Machines Corporation, the department recently completed installation of an IBM 650 electronic data processing machine.

Charles L. Miller, associate professor of civil engineering, will be director of the new laboratory and Robert A. Laflamme, an instructor in civil engineering, will be responsible for technical supervision. Prof. Miller said at least half of the machine time will be devoted to academic activities and the balance to research activities.

HI-WAY Model AS Bituminous Paver



A Jack of All Trades, Tow-Type Paver...
a Running Mate for your Self-Propelled Equipment

A fast worker on driveways—parking lots—playgrounds—airports—streets, roads and highways—and on any job you can drive a truck through. A paver small contractors and townships alike, can easily afford. Adjustable full floating screed permits concave surfaces up to 1½" crown. An optional heated screed permits paving with hot or cold mixes. Hydraulically operated spring-loaded shutoff gate eliminates emptying at end of the run. Can also be used to spread aggregates.

Other Model AS Features

- *Screed raised, lowered or locked in road-traveling position by hand crank*
- *Available in 8, 9 and 10' widths with capacities up to 1⅓ cu. yd.*
- *10 gauge, reinforced hopper with smooth sloping sides*
- *Folding type operator's platform on each side of paver*

Write for the latest literature and complete specifications.

HIGHWAY EQUIPMENT COMPANY
627B "D" Ave. N.W. • Cedar Rapids, Iowa

HI-WAY
SALES & SERVICE
Nationwide

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458-Mile Emergency Resurfacing Program

An emergency resurfacing program covering 458 miles of state trunklines in 52 counties has been added to Michigan's 5-year road program.

In addition, 192 miles of trunklines will be widened in the $13.6 million program based on a field survey of need.

This work includes restoration required for trunklines, soon to be turned over to the counties as and when replaced by new expressways. Over 120 projects have been mapped for awarding to contract this spring and early summer.

Meetings

FORTY-SIXTH ANNUAL PURDUE ROAD SCHOOL, Purdue University, Lafayette, Ind.; April 18-21.

MARYLAND HIGHWAY CONTRACTORS ASSOCIATION—Spring Meeting, Baltimore, Md., April 21.

AMERICAN WELDING SOCIETY—41st Annual Convention and Exposition, Biltmore Hotel and Great Western Exhibit Center, Los Angeles, California; April 26-28.

EIGHTH HIGHWAY TRANSPORTATION CONGRESS—National Highway User's Conference, Washington, D. C.; May 10-12.

The Cat No. 12 Motor Grader: Tops in its class on any road!

No matter what the type of road or road work, you can count on top performance at low operating cost from a No. 12. On country roads and cross-country highways, this rugged machine has earned its reputation as "The Standard of the Industry."

Here, for example, a No. 12 is working on a stretch of interstate construction near Buchanan, Virginia. Says Superintendent Robert O. Shook of the Nello L. Teer Company, Durham, N. C.: "From my experience with various motor graders I am convinced that the No. 12 is tops in its class. We can get more work out of a No. 12 because it gives us less maintenance trouble—it stays on the job with a minimum of down time. We also get excellent service from our Caterpillar Dealer."

Many factors make the No. 12 a big producer. Here are some:

MECHANICAL CONTROLS (standard) provide precise adjustment, reduce kickback, ease engagement. "Anti-creep" lock makes blade stay put under load.

UNEQUALED VISIBILITY results from the No. 12's dash-mounted lift gears and low frame design. While seated, the operator has an unobstructed view of the critical areas at the front wheels, toe of blade and circle.

EXCLUSIVE OIL CLUTCH provides up to 2,000 hours' service without adjustment, the equivalent of about 12 months of "adjustment free" operation. Virtually eliminates down time for clutch repair.

OPTIONAL AUTOMATIC BLADE CONTROL is an attachment that cuts grading time in half. Operator sets desired slope on dial and only has to control depth of cut. Now transistorized for freedom from maintenance and adjustment, the unit automatically maintains blade slope within ⅛″ in 10′. Fine for *all* types of grading.

See the improved No. 12 at your Caterpillar Dealer. Whatever the job, he has the right capacity motor grader for it. Besides the 115 HP No. 12, there's the big new 150 HP No. 14 and the 75 HP No. 112. Ask for a demonstration.

Caterpillar Tractor Co., General Offices, Peoria, Illinois, U.S.A.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

LESS DOWN TIME, MORE PRODUCTION... CAT MOTOR GRADERS

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Mayer to Head AED

Herbert J. Mayer of San Francisco, has been named President of the Associated Equipment Distributors. Mayer was formally moved up from the post of senior vice-president following the untimely death on Feb. 19th of Jewel A. Benson, who less than a month earlier had taken the oath of office as the Association's 41st President.

Upon taking the helm of AED, President Mayer pledged to support and carry out the objectives for 1960 which had been set forth by Mr. Benson four weeks previously at the Association's 41st Annual Meeting in Chicago. These goals, he said, would guide AED through one of the most purposeful years in the Association's history.

The new head of AED is Executive vice-president of Western Machinery Co., and general manager of Edward R. Bacon Co., both in San Francisco, Calif.

Herbert J. Mayer

At the same time, Richard F. Newlin of Newlin Machinery Corp., Kansas City, Kan., was inducted as AED Senior vice-president. Newlin had previously been elected to a second term as vice president at the January Annual Meeting.

In a special appointment by the Board of Directors, John R. Borchert of Borchert-Ingersoll, Inc., St. Paul, Minn., was named vice-president. He is a former AED Director in Region VIII, Treasurer, and current chairman of the Finance Committee.

To his new job as AED President, Mayer brings with him a background of extensive Association activity. He served as Vice President in 1959, and as Director of Region 11 (Arizona, California, Nevada, and Hawaii) in 1958.

Continued on page 28

THE NEW HANCOCK ELEVATING SCRAPER
(Shown on John Deere 840 Tractor)
FORCED EJECTION • LARGER TIRES • NEW DRIVE
HEAVIER • MORE CAPACITY

Take advantage of these new features that are time and money savers for you! Forced ejection saves you operating time and manpower by providing a positive — controlled dump. Larger tires make the heavier, improved scraper more maneuverable. New, improved drive means heavier loads with less horsepower than ever before . . . 7½ yard and larger capacities. The new Hancock Scraper can be pulled with either the 830 or 730 John Deere, or similar industrial tractor, with front wheel dolly; or by direct connection to tractor. For "Engineered" help with your earth moving problems, contact Hancock today!

HANCOCK MANUFACTURING COMPANY
PO 3-8297 P. O. BOX 1359 LUBBOCK, TEXAS

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NYGEN-BUILT

GENERAL TIRES

keep driving longer for lowest cost-per-mile

It takes just one "down" unit to wreck schedules, eat up narrow profit margins. That's why more and more contractors count on the Nygen-built General Tire to keep units rolling whatever the going. Engineered for maximum traction and minimum rolling resistance, Generals take mud, sand, rock and grades in stride . . . help hold costs down to keep profits up. Prove it to yourself on your next big job.

THE GENERAL TIRE & RUBBER CO. Akron, O.

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QUICK DETACH-ABLE ROGERS TRAILERS for

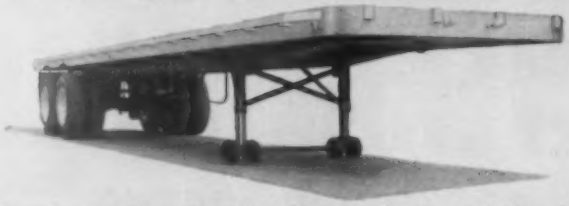
FASTER LOADING...SAFER LOADING

Every contractor should have at least one Rogers Detachable Gooseneck Trailer which simplifies front loading, speeds moves and lowers costs.

The exclusive Patented hydraulic jack also permits travel with the front of the deck above or below the normal position to clear road or overhead obstructions. It will even raise the rear of the trailer off the ground to change tires. All these advantages and more, too, at competitive prices.

Choose a model powered by the tractor's winch or power-take-off; or with engine in gooseneck which permits trailer to be used with any tractor.

ROGERS HIGH-FLATS *for* TOP PERFORMANCE *with* HEAVIER LOADS



Conforming to Rogers policy these trailers are designed for quality performance yet priced to deliver top value.

Features are: time-tested spring-mounted bogies; rugged, dependable brakes; substantial rub-rails with stake pockets to provide easy means of adding bulkhead and side enclosures.

Available also are 35-ft. models which may be extended to 45 or 55 feet for hauling long objects.

ROGERS BROTHERS CORPORATION

DESIGNERS and BUILDERS of HEAVY DUTY TRAILERS. SINCE 1915

ALBION, PENNA.

EXPORT OFFICE: 50 CHURCH ST., NEW YORK 7, N. Y., U.S.A.

Cable Address: BROSITES

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People

Continued from page 26

For five years he was a member of AED's Industry Round Table, serving as co-chairman in 1957. In addition, he served on the AED Equipment Financing and National Affairs Committees. In 1953, he was elected President of the Construction Equipment Distributors of Northern California.

Other 1960 officers of AED include: Braxton Blalock, Jr., Blalock Machinery & Equipment Co., Atlanta, Ga., and R. Boyd Somerville, Ontario Supply & Equipment Ltd., Toronto, Ont. (vice-presidents); and W. R. Parnell, Construction Machinery Corp., Shreveport, La. (treasurer).

Hugh J. Hush Dies

Hugh J. Hush, President of the Griffin Equipment Co. and the Griffin Wellpoint Corp., New York City, died as a result of a heart attack at the age of 54 on Wednesday, March 2.

Hush was 1952 President of the Associated Equipment Distributors and long an active leader in AED affairs. He was director of Region II (New York) from 1946-1950, chairman of the convention committee in 1947 and again in 1949, vice-president in 1950, executive vice-president in 1951, and chairman of the equipment financing committee in 1957.

Fred Panhorst Retires in California

Frederick W. Panhorst, who has directed the construction of probably more highway bridges than any other person, has retired from the California Division of Highways after a long career.

Retiring from his recent post as assistant state highway engineer—Bridges, Panhorst headed the State's bridge section for the past 29 years, being responsible for the planning, design, construction and maintenance of $1 billion in bridge and tunnel projects, grade separations and interchanges on the State's expanding network of free-

Continued on page 30

For a better profit picture...

CHECK EUCLID C-6 WORK-ABILITY

You'll find this new C-6 has the all-around tractor versatility needed for heavy construction, mine and quarry work. With five years of rugged field and proving ground test, this new crawler sets higher standards of performance on the toughest jobs for tractors in the 200 h.p. class.

Here are just a few advantages you get in the C-6 . . . a dependable GM 6-71 engine delivering 211 net h.p. to the power train . . . a proven Torqmatic Drive that provides full-power shift and cuts cycle time . . . fast-as-a-fox maneuverability . . . almost unbelieveable ease of handling . . . accessibility for servicing that pays off in more productive time on the job. It responds like nothing you've ever touched!

Have your Euclid dealer give you all the facts on the C-6 . . . he'll show you why this new "Euc" belongs in your spread . . . why it's your best equipment investment.

EUCLID Division of General Motors • Cleveland 17, Ohio

GM GENERAL MOTORS EUCLID

EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE

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People

Continued from page 28

Frederick W. Panhorst

ways. The recent work under his direction has run to $140,000,000 in structure work yearly.

During this period, Panhorst has seen his staff grow from 115 to a present nearly one thousand persons whose experience in three decades has encompassed over 6,000 bridges and structures, including many major projects in the Bay area and most recently the Carquinez Bridge on U.S. 40.

Panhorst is a past national director of the American Society of Civil Engineers and has held committee posts in AASHO and many other organizations.

Succeeding Panhorst is James E. McMahon, who has been in charge of the California department's bridge branch office in Los Angeles since 1953. Dale F. Downing recently assistant bridge engineer for state-owned toll bridges, moves up to McMahon's former position.

Minnesota Concrete Paving Group Elects

P. E. Maxwell, vice president of E. W. Coons Co., Hibbing, Minn., was elected president of the Concrete Paving Association of Minnesota at the organization's first annual meeting recently in St. Paul. He succeeds Warren B. Woodrich,

P. E. Maxwell

treasurer, Woodrich Construction Co., Hopkins, Minn., who will continue to serve on the board of directors as immediate past president.

Other association officers named are John Woodhall, Jr., project manager, Central States Construction Co., Willmar, Minn., secretary, and Donald G. McCree, president, McCree & Co., St. Paul, treasurer.

Continued on page 32

Sand would scrape the markings off most tapes!

This is Lufkin's Super HiWay®. Engineers and layout men swear by it. The big reason: it has a Chrome Clad® line that defies defacement . . . by sand, mud, grit or years of use.

Raised markings and protective borders are a part of the tape itself . . . and will last as long. The line is .025" thick with a rust-resistant base coat and a series of electroplatings, topped by a final layer of tough chrome. It's the most durable tape line made.

Available in 100', 200' and 300' lengths, with or without reels. Three choices of end markings plus chainman's conversion rule.

THE LUFKIN RULE COMPANY

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ALLIED Jet Seal on the job at NIAGARA

THE WORLD'S GREATEST POWER PROJECT

Sealing a vertical joint on the 22' ft. radius dome of the conduit.

Allied JET SEAL (Hydraulic Product 9015-T-1) is the specified concrete conduit sealant for the $850 million Niagara Power Project.

The twin, giant conduits—66 feet high and 44 feet wide—are a major part of this New York State Power Authority project that will supply nearly two million kilowatts of electricity to New York, Pennsylvania and Ohio.

Allied JET SEAL was chosen as the preferred sealant for the conduit domes because of its superior application, adhesion, rapid curing time and long life.

ALLIED JET SEAL APPLIED ROUND THE CLOCK . . . IN ALL WEATHER

At Niagara crews are applying Allied JET SEAL to the reinforced concrete conduits along three longitudinal and regular transverse joints of the arched dome cover (see photo above).

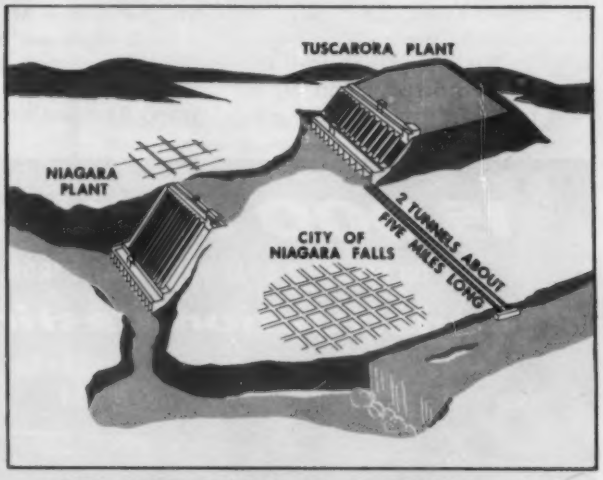
Laid in trenches as deep as 180 feet, the conduits will be covered with fill so that the surface can be utilized. The dome of the conduits must be strong enough to support this weight and tight enough to contain the water. Allied JET SEAL's outstanding resiliency and tough waterproofing qualities help make this possible.

The two-component, polysulfide-based sealant is applied after sand-blasting of the concrete joints. Upon curing it develops a tight bond with the concrete interface of the joint. It remains resilient and able to absorb contraction and expansion without cracking or breaking away from the joint.

Application is done with specially equipped rigs (shown above) capable of applying JET SEAL at 90°F in all kinds of weather. The primary unit in this set-up is the special JET SEAL Applicator, originated and manufactured by Allied.

Where a superior joint sealant is called for—as at Niagara—Allied JET SEAL is ready to meet and TOP the specifications. It is in use now on many major projects throughout the country: Hydraulic (JET SEAL 9015-T) Highway (JET SEAL 9015-H) Military (JET SEAL 9015-M).

For more of the story of Allied JET SEAL, the Superior joint sealant, write:



Allied JET SEAL Protects 82,000 Feet of Concrete Conduit

The twin conduits where Allied JET SEAL is being used (shown in red) stretch from the in-take facility (lower right) to the open canal. This diverted water is then lifted by pumps into the reservoir above the Tuscarora Station.

Released from the reservoir, the water drops through penstocks into scroll cases to fuel Tuscarora's turbine generators. From there it flows down the canal to Niagara Station to perform the same service. From Niagara Station the water is returned to the river.

ALLIED MATERIALS CORP.

PRODUCERS, REFINERS AND COMPOUNDERS FOR OVER 27 YEARS

ALLIED BUILDING • 5101 N. PENNSYLVANIA • P. O. BOX 7103 39th Street Station • Oklahoma City, Oklahoma
Plants: Stroud, Okla. • Detroit, Mich. • Los Angeles, Calif.

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At ARBA's Annual Convention

Seen at American Road Builders Association's recent Cincinnati convention—guests of Firestone Tire & Rubber's reception: The Honorable Dennis Chavez, chairman, Senate Committee on Public Works; Mrs. Chavez; Nello L. Teer, Jr., contractor of Durham, N.C. (ARBA president); H. M. Taylor and J. L. Cohill, Firestone vice presidents; Mrs. Louis W. Prentiss; J. E. Mitchell, Firestone manufacturers sales (ARBA director); Maj. Gen. Louis W. Prentiss, (USA-ret.), ARBA executive vice president.

People

Continued from page 30

New District Engineers in New York D.P.W.

New district engineers have been appointed at Syracuse, Hornell and Babylon (Districts 3, 6 and 10) by New York state department of public works, as announced by superintendent J. Burch McMorran. The appointees respectively are Earle E. Towlson, William J. Dennis and Austin M. Sarr.

Each appointee is a professional licensed engineer who has served in the department more than 30 years. Each was named from a civil service list established from an examination for the title of district engineer. The salary of New York district engineers begins at $15,084 with regular increments to $17,454. Towlson has ben acting district engineer as Syracuse since 1957. Dennis replaces James H. Thomas who is retiring. Sarr succeeds Milton E. Goul who also has retired.

15,000 Patterns
ON HAND FOR GRAY AND DUCTILE IRON
Construction Castings
WITH LARGE STOCKS MAINTAINED FOR PROMPT SHIPMENT ANYWHERE

Send for free 168-page catalog.
NEENAH FOUNDRY COMPANY
Neenah, Wisconsin
Chicago Office: 5445 North Neva Avenue, Chicago 31, Illinois

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Hubert E. Sargent Passes

One of the best known highway personalities in eastern U.S., Hubert E. Sargent, died recently. He held the distinction of serving as chief engineer for the Vermont department of highways continuously

Hubert E. Sargent

from 1925 until his death. From 1930 to 1939 he doubled as commissioner of highways, and for ten years he was a member of the AASHO executive committee.

does work of crew with 4-in-1 BUCKET

The Town of Gates, N. Y. is a thriving, progressive community, with 60 miles of roads, 42 of which are well maintained by the Gates Highway Department. When the time came to replace its tractor-shovel, a "PAYLOADER" equipped with a Drott 4-in-1 bucket was selected. It is used for new construction, general maintenance, snow removal, right-of-way clean-up, stockpile handling and scores of other jobs the year around.

"AN ALL PURPOSE MACHINE"

George Biesenbach, Highway Supt. is really enthusiastic about his winning combination, reporting that, "It is an all-purpose machine that saves us time and labor in nearly all our work. On-the-job experience is proving that our PAYLOADER with Drott 4-in-1 bucket and a single operator can do many jobs alone which used to take extra labor with a regular tractor-loader. We really like the PAYLOADER because of its unmatched versatility and because it does our jobs better, faster and more economically."

A "PAYLOADER" with 4-in-1 will also give you job versatility you've never before experienced . . . use it as a bulldozer, as a scraper, a clamshell or as a standard excavating-loading bucket. Find out what it will do for you. Return the coupon or see your Hough Distributor, today.

HOUGH®

THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

HOUGH, PAYLOADER, PAYMOVER, PAYLOGGER and PAY are registered trademark names of The Frank G. Hough Co., Libertyville, Ill.

With clam raised, the "4-in-1" bulldozes and backfills trenches, also levels and grades.

The Drott bucket also serves as a conventional bucket for excavating or loading.

THE FRANK G. HOUGH CO.
768 Sunnyside Avenue, Libertyville, Ill.

Please send data on complete "PAYLOADER" line and attachments.

Name.....

Title.....

Govt. Unit.....

Street.....

City.....State.....

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MIRO-FLEX
IS YOUR
BEST SOURCE FOR
ROAD CONSTRUCTION
SIGNS

CUSTOM MADE TO
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Miro-Flex will meet state and company specifications on all types of Road Construction Signs **made to order** — following instructions on material, measurements and reflectorization. Prompt service — satisfaction guaranteed!

Double-side STOP and GO Hand Signal and portable MEN WORKING sign (above), are two of many standard construction signs available.

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THE MIRO-FLEX CO., INC.

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New Publications

Cost Estimating for Earthmovers

"Basic Estimating," a comprehensive, 76-page book dealing with factors necessary for profitable earthmoving, forestry and pipelining operations, has been issued by International Harvester Company's Construction Equipment Division.

The introduction states: "Nowhere else in our nation's economy can one find better evidence of man's ingenuity and resourcefulness than in his use of construction machinery to mold the earth's surface to his liking.

"The men who sell construction equipment are playing a dominant role in this movement. Their task is to recommend the proper type and size of machines for a given job out of an ever-broadening line of equipment.

"Such responsibility entails an extensive personal knowledge of a wide number of equipment applications, a knowledge of the cost of owning and operating equipment, and the production capacity of machines in those applications."

The publication, prepared by International's Sales Development Section, consists of six chapters:

The first section deals with Bulldozer, Bullgrader applications; forest industries applications; pipeline applications; push tractor applications; general excavation applications; general considerations—tracks vs. rubber.

Section Two, titled "Estimating Hourly Production," covers such topics as basic formula, efficiency hour, in-bank correction factors, machine capacity, cycle time, applying basic formula on-the-job, applying basic formula on future jobs, travel cycle-time factors and fixed cycle-time factors.

The third section is devoted to estimating fixed and operating costs. Section Four—"Estimated Production of Machines"—gives production curves on International equipment, as a guide to production capabilities under a given set of conditions.

Fifteen pages of reference data comprise the fifth and final section. The publication, profusely illustrated with charts, diagrams, tables and formulae, is available from International Construction Equipment distributors.

Seelye Design Handbook

"Data Book for Civil Engineers—Design, Volume I". by Elwyn E. Seelye. 9½ x 11½, Cloth Cover. Price $24.00. John Wiley & Sons, Inc. 440 Fourth Avenue, New York 16, N.Y.

This completely revised third edition of a three volume series provides a concentrated collection of the data necessary to design, place under contract and construct all types of civil engineering structures. Modern codes, practices, and designs are clarified and tables for pre-stressed concrete, limit design, composite beam construction, and the AASHO road standards have been emphasized.

This edition represents advice or criticism given by many leading authorities.

Seelye's Data Book

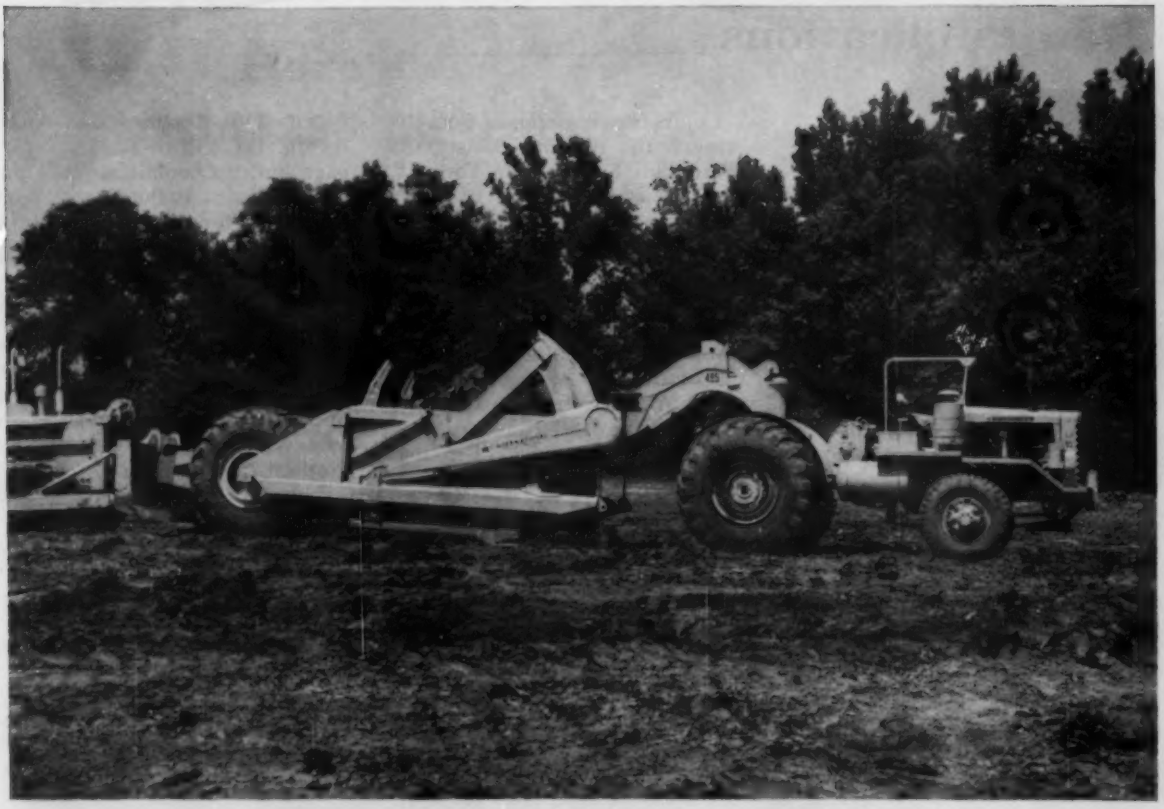
Volume 1 (Design) of Seelye's classic "Data Book for Civil Engineers" is published in a third edition. 684 pages, $24.00. John Wiley & Sons, Inc., 440 Park Avenue South, New York 16, New York.

Long a standard reference for engineers, the volume has again been up-date with information necessary to design, place under contract, and construct all types of civil engineering structures.

The 24 chapters have many new subchapter headings: prestressed concrete; ultimate strength concrete design; plastic design of steel; aluminum design; and wind pressures of tanks, towers, and roofs; geometrics for highways; highway capacity, parking data; airport and heliport design, etc.

A third edition of Volume II of the series, covering specifications and costs, was published in 1957 ($20.00); Volume III, 2nd edition, on field practice, in 1954 ($7.50).

Continued on page 36



***Geared with Fuller* ROADRANGER** ... Three International Model 495 Payscrapers belonging to V. H. & M. Construction Co., Denham Springs, La., handle a total of 4500 to 5000 cu. yds. of material every 10½ hrs. in construction of Interstate Highway I-10 between Jennings and Egan, La.

Faster work cycles boost profits... COUNTERSHAFT BRAKE SPEEDS UPSHIFTS

Longer gear and bearing life with Pressure Filtration and Lubrication

Heavy rainfall and deeply-rutted, wet blue-clay surface have been major obstacles to the work of V. H. & M. Construction Company on a Louisiana highway project. Fighting weather, time and terrain, V. H. & M. handles a total of 4500 to 5000 cu. yds. every 10½ hours with 3 International Model 495 Payscrapers equipped with semi-automatic 9-speed Fuller R-1160 ROADRANGER Transmissions. Standard equipment on the R-1160 includes the Fuller Air-Powered Countershaft Brake and Pressure Lubrication and Oil Filtration System.

E. D. Pinkston, Superintendent, says, "Thanks to our Fuller-equipped Payscrapers, our production is very good despite miserable operating conditions and material which is extremely tough to handle. Our operators like the Fuller countershaft brake. It gives quick, easy upshifts without double clutching, keeps speeds up and cuts cycle time. And the pressure lubrication and filtration system prolongs gear and bearing life."

Ask your dealer about the off-highway Fuller Transmission . . . with countershaft brake and pressure filtration system as standard equipment . . . designed to put more profit in *your* operation.

FULLER

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Unit Drop Forge Div., Milwaukee 1, Wis. • Shuler Axle Co., Louisville, Ky. (Subsidiary) • Sales & Service, All Products, West. Dist. Branch, Oakland 6, Cal. and Southwest Dist. Office, Tulsa 3, Okla.
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New Publications

Continued from page 34

Gas Shielded-Arc Welding Reference

The first AWS book on Gas Shielded-Arc Welding Processes is announced by the American Welding Society. Containing 78 pages, 39 illustrations and 9 tables, the book describes in detail the group of processes which originally went under the name of Inert-Gas Processes. The development of shielding gases, such as CO_2, which are not inert, caused the change of name.

The contents are taken from published and unpublished material from Sections I, II and III of the Fourth Edition of the Welding Handbook. Included in this small, authoritative book are: Gas Shielded Tungsten-Arc Welding, Gas Shielded Metal-Arc Welding (including CO_2 Welding), Cutting, Gases, Equipment, and Cost Data. The book is profusely illustrated and photographs, schematic diagrams or charts show every step.

Copies may be obtained from the American Welding Society, 33 West 39th Street, New York 18, N. Y. Price $1.50.

Steel Casting Uses

The use of steel castings in heavy construction and in manufacturing of construction equipment is featured in a new free booklet published by the Steel Founders' Society of America, 606 Terminal Tower Building, Cleveland 13, Ohio.

Entitled "Sinews of Modern Living," the 28-page booklet tells the many uses for steel castings. Line drawings of more than 200 representative steel castings, selected from over 1,000 photographs and references, are shown.

TRAFFIC BEHAVIOR ON FREEWAYS. Bulletin 235. Highway Research Board, 2101 Constitution, Washington, D.C. Price $2.40. A 132-page bulletin containing four papers presented at the Board's 38th annual meeting (January, 1959).

PUBLICATIONS OF THE INTERNATIONAL ASSOCIATION FOR BRIDGE AND STRUCTURAL ENGINEERING. Volume 19 (1959). 296 pages, 168 figures, in paper cover. SFr. 40 Verlag Leemann Zurich, Arbenzstrasse 20, Postfach Zurich 34, Switzerland.

The 19th volume of "Publications" contains 15 papers of which 12 are in English, one in French and two in German. Each paper is followed by a summary in all the three languages. The various contributions refer to problems falling within the Association's province; i.e., the various aspects of steel and reinforced concrete construction. The articles deal with theoretical problems and with questions concerning construction and execution.

Unique Wire Brush Polices Traffic Areas

Geo. M. Brewster & Son, prominent New Jersey contractor, has the problem of constantly removing compacted mud and dirt from approach areas leading to construction of the second deck of the George Washington Bridge. But, he has the right answer — he's using Danline! One pass by a Danline is equal to three with a fibre broom whether on mud, paving chips or ballast — real performance on a difficult job. And, real economy as one Danline outwears 15 fibre brooms — provides fast self assembly. There are many other excellent examples over the nation of Danline sweeping superiority. Danline fits all types and makes of modern sweepers. Write now for details and illustrated brochure.

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Leadership Proved Through Performance!

NEWARK BRUSH COMPANY
260 MICHIGAN AVENUE
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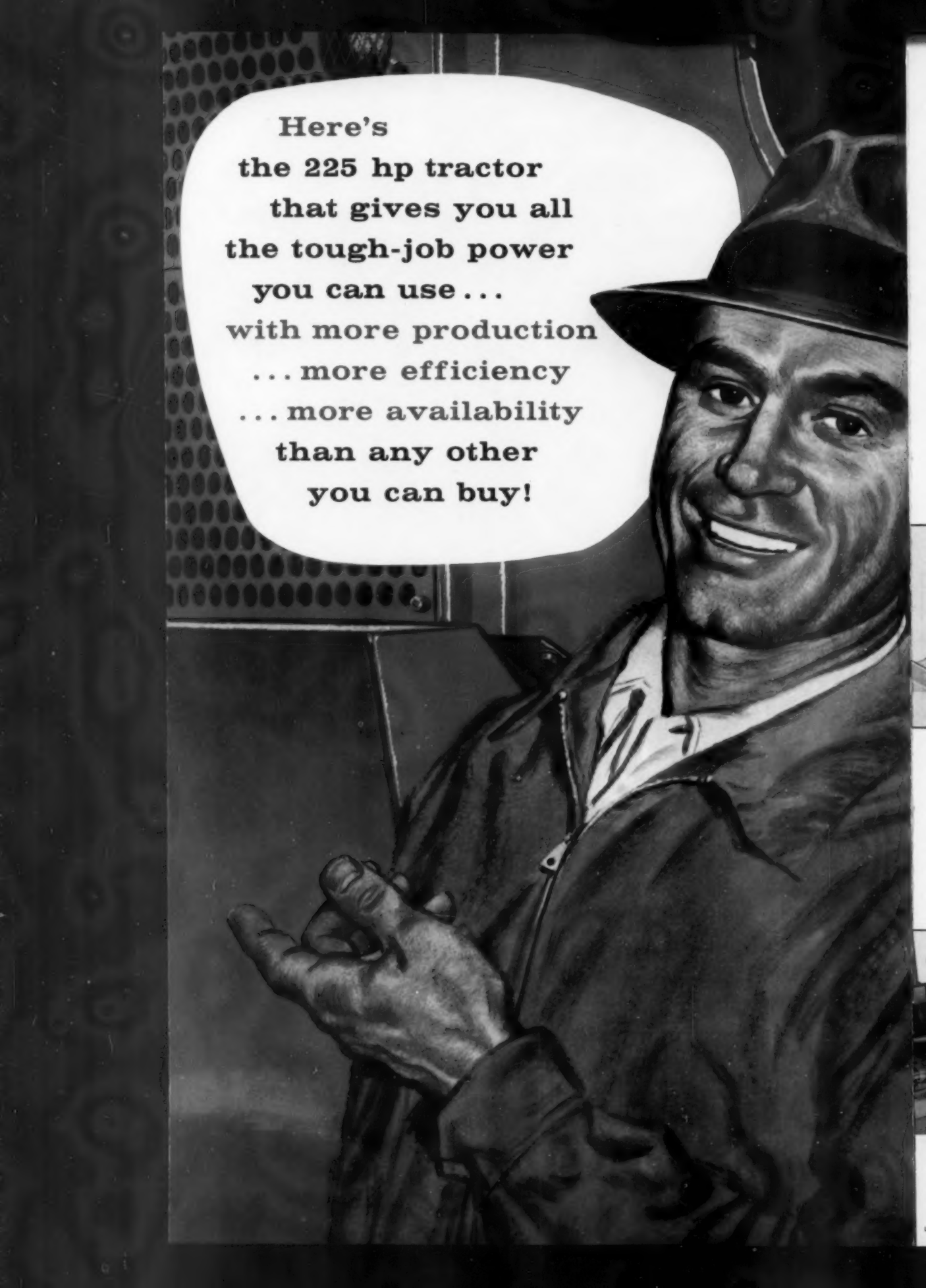
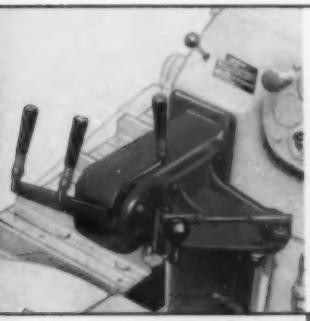
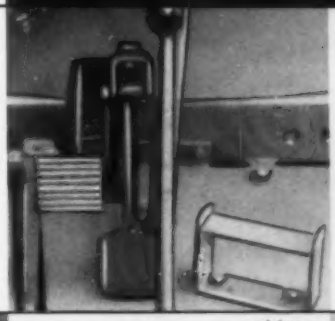

Here's
the 225 hp tractor
that gives you all
the tough-job power
you can use...
with more production
...more efficiency
...more availability
than any other
you can buy!

The Allis-Chalmers HD-21 is just what the operator ordered. Big, adjustable foam-rubber seat, console controls, excellent visibility and clean, flat platform help him maintain high production levels with less effort. Torque converter drive eliminates most shifting, and *certified* permanent lubrication of truck wheels, idlers and support rollers eliminates an unpleasant "nuisance" chore without endangering your investment.

YOUR MEN WILL LIKE THE 21's EASE OF OPERATION AND MAINTENANCE

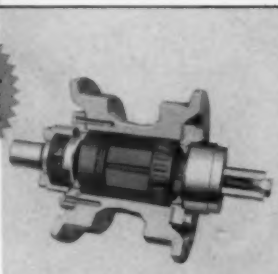


Conveniently grouped console controls take the stretch and pull out of big tractor operation.



Foot decelerator speeds shifting, frees operator's hands for other controls.

Bucket seat, available optionally, provides extra support, extra comfort for operators.



Positive seal, tapered roller bearing truck wheels, idlers and support rollers are permanently lubricated at factory . . . need no further greasing.

True unit construction allows removal or replacement of any power train assembly without disturbing adjacent assemblies.

Your Allis-Chalmers dealer will show you the HD-21 in action—whenever you say. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wis.

move ahead with ALLIS-CHALMERS

. . . power for a growing world

LITHO IN USA D&J-60

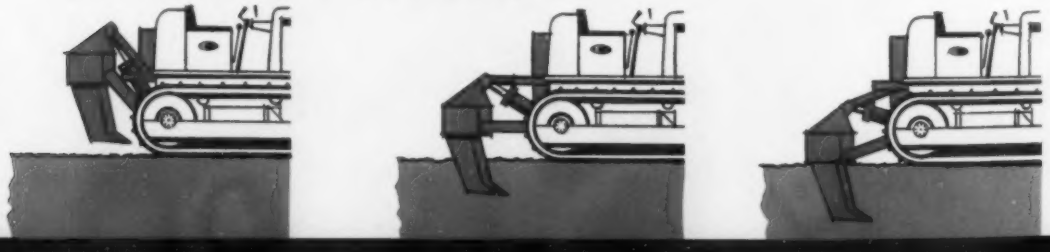
ALLIS-CHALMERS HD 21

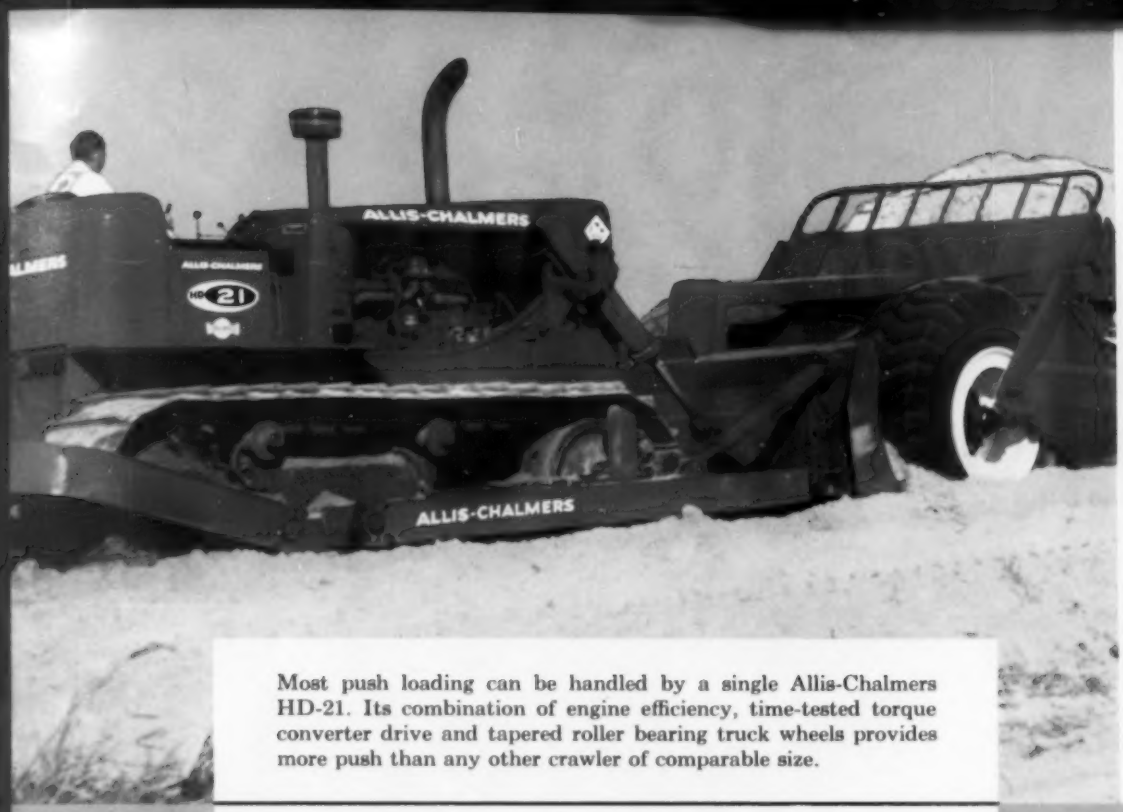
The industry's healthiest engine, coupled to torque converter drive proved through almost 20 years of use, gives the 225-hp Allis-Chalmers HD-21 more work power than any other crawler in its class. In addition, only the HD-21, in its class, is equipped with tapered roller bearings in truck wheels, idlers and rollers to build usable power by reducing friction.

225 TURBOCHARGED HP

NET ENGINE HORSEPOWER . . . TORQUE CONVERTER DRIVE

The unique parallelogram design of Allis-Chalmers rippers keeps shanks at the most effective angle . . . up . . . halfway down . . . down full depth. Close-in mounting permits working close to slopes.





Most push loading can be handled by a single Allis-Chalmers HD-21. Its combination of engine efficiency, time-tested torque converter drive and tapered roller bearing truck wheels provides more push than any other crawler of comparable size.

With big motor scrapers in tough cuts, 21's in tandem give you the biggest 450 hp you've ever seen. They will supply all the push power you need, plus the flexibility to split up and build profit . . . dozing . . . ripping . . . and pushing in ordinary conditions.

WHATEVER YOUR POWER NEED HD-21's PROVIDE IT

225 turbocharged hp, single
450 turbocharged hp, tandem

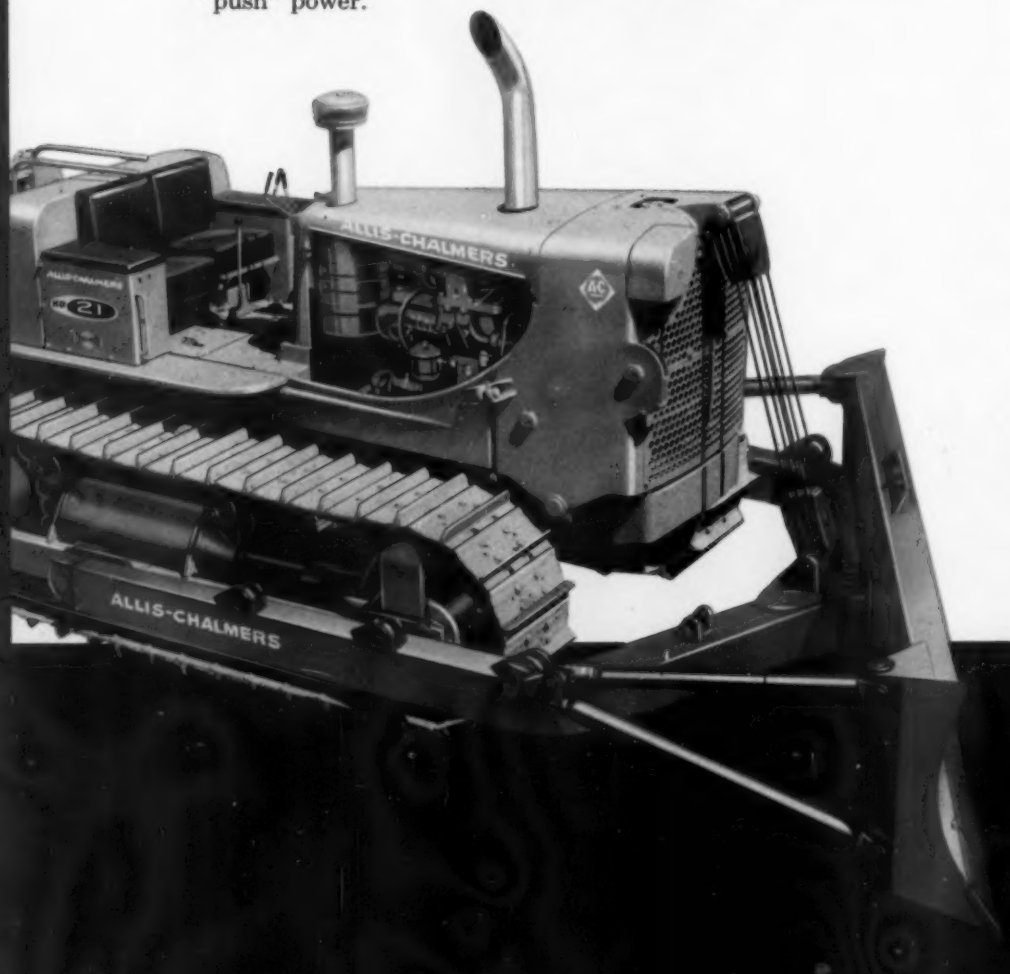
For the fraction of a minute in each loading cycle during which extreme power *may* be required, double up your 21's without sacrificing the flexibility of separate units to rip, doze and handle the usual pushing jobs. Even in the tough cuts, you actually need this extraordinary horsepower only during the relatively short "top out" segment of the cutting cycle. If all this power is in a single pusher, much of it is wasted most of the time. With pairs of HD-21's, you have all the push power you need *plus* the flexibility to use it most efficiently.

THE MOST EFFECTIVE RIPPER-DOZER TEAM YOU CAN BUY

Just getting more work power from your HD-21's means more effective *power* for ripping . . . dozing. However, when you add the advantages of Allis-Chalmers ripper and dozer designs, the difference becomes even more discernible . . . more important to your production and profit.

★ ★ ★

Allis-Chalmers dozers are close-mounted to provide excellent tractor-dozer balance for increased production . . . easier control. High-strength alloy steels, special steel shapes, submerged arc automatic welding and hardened connecting points supply the structural strength to match all of the HD-21's tremendous "push" power.



THE MOST PROFITABLE SIZE FOR YOUR BIGGEST JOBS

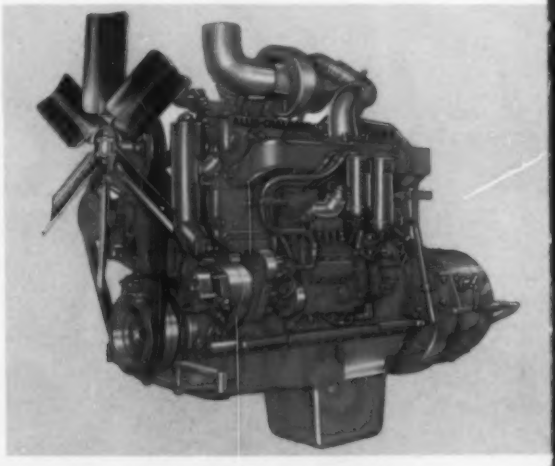
Here's all the power you need to handle the tractor work on your biggest jobs. Singly, the HD-21 will manhandle the vast majority of dozing, ripping, pushing—in tandem they will delight you with the enormous power needed to load your biggest scrapers in tough material.

Whenever conditions permit single pushing, you can use the extra power on other jobs—pioneering, ripping, leveling fills.

In addition, when maintenance is in order, you don't have to shut down ... one HD-21 will keep your scrapers going while the other is being serviced.

Allis-Chalmers HD-21's are the biggest producers in this most efficient 225 hp class. Here's why:

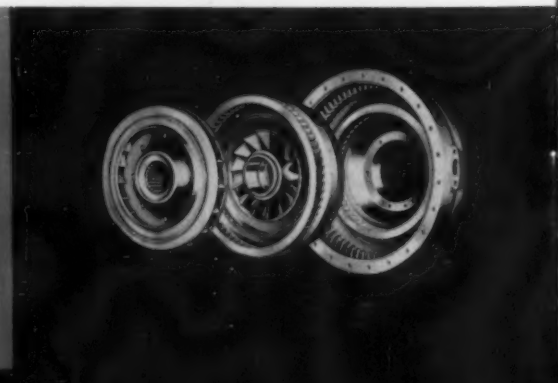
One outstanding example is the performance of the *industry's healthiest* engine coupled to the *best-proved tractor torque converter* to give you maximum power automatically, economically. Almost 20 years of know-how assures you that Allis-Chalmers engines and torque converters are built right to work together with maximum efficiency. In addition, since the HD-21 is the only crawler in its class that rolls on friction-free *tapered roller bearings*, you get more real work power than any other can supply.



Allis-Chalmers 21000 turbocharged engine—is rated conservatively at 225 hp at 1825 rpm . . . gives you up to 27% better fuel economy than other engines in this class.

All-steel main frame—soaks up vertical, horizontal and twisting strains . . . allows more efficient equipment mounting . . . permits unit construction of assemblies for faster, easier servicing.

Torque converter—hydraulically cushions entire power train . . . protects all tractor components and mounted equipment from damaging shock and strain.



New Crane Rating Standards Will Help Equipment Purchaser

A new and uniform method of rating full-revolving power cranes has been unanimously adopted by the members of the Power Crane and Shovel Association.

Wilbur L. Schield, of Schield Bantam Company, Association president-elect, stated that this action was taken to eliminate the industry's long-felt need to reduce confusion and help crane distributors, purchasers and users compare machines on a uniform and equitable basis.

The method as adopted by the Association, is as follows:

1. Crawler-mounted, truck-mounted, and wheel-mounted cranes will be rated on the basis of the maximum load, in tons, at the radius selected by the manufacturer (in accordance with Commercial Standards CS90-58, paragraph 6.06).

2. The crane rating will be supplemented by a second group of numbers to designate the Power Crane and Shovel Association classification into which the crane falls. This identification will consist of two numbers, as follows:

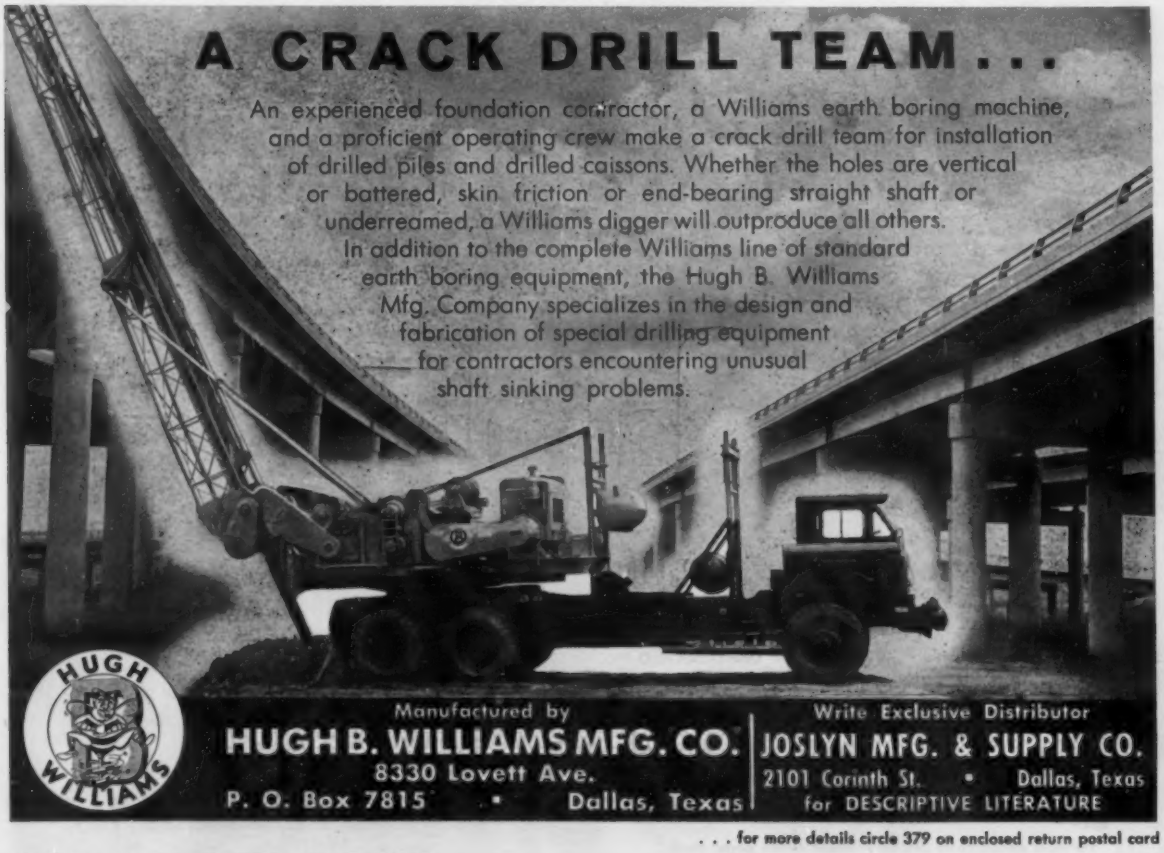
a. The crane rating radius, in feet, of the maximum rated load, with base boom length, as determined under Paragraph 1.

b. The rated load (expressed in pounds divided by 100, and rounded off to the nearest whole number) at 40-ft. radius, with 50-ft. boom length.

3. The above values are to be based on the crane ratings in the direction of least stability, with outriggers set, if the machine is so equipped.

4. Example: assume a truck crane rated, under Par. 1, with base boom length, at 40-ton at 12 ft. radius; and at 19,600 lb. with a 50-ft. boom at 40 ft. radius.

As explained by E. F. Rueter, chief engineer of Unit Crane and Shovel Corp. and chairman of the association's standards committee which developed this method, the classification would then be: 40


A CRACK DRILL TEAM . . .
An experienced foundation contractor, a Williams earth boring machine, and a proficient operating crew make a crack drill team for installation of drilled piles and drilled caissons. Whether the holes are vertical or battered, skin friction or end-bearing straight shaft or underreamed, a Williams digger will outproduce all others. In addition to the complete Williams line of standard earth boring equipment, the Hugh B. Williams Mfg. Company specializes in the design and fabrication of special drilling equipment for contractors encountering unusual shaft sinking problems.
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Ton Truck Crane (PCSA Class 12-196). The figure "12" comes from the rating radius (Par. 2-a) and the 196 from dividing 19,600 by 100 (Par. 2-b).

The standards committee in adopting this method felt that it will occasion the least dislocations in existing manufacturer's methods and rental situations. It will enable purchasers and users to make understandable comparisons between models, mountings and manufacturers. The association is taking steps to incorporate this method in the U. S. Dept. of Commerce, Commercial Standards CS90-58.

The members of the Power Crane and Shovel Association subscribing to the above method are: Baldwin-Lima-Hamilton Corp.; Bay City Shovels, Inc.; Bucyrus-Erie Company; Clark Equipment Company; Gar Wood Industries, Inc.; Harnischfeger Corp.; Insley Manufacturing Corp.; Koehring Company; Link-Belt Speeder Corp.; Manitowoc Engineering Corp.; Marion Power Shovel Co.; "Quick-Way Truck Shovel Co.; Schield Bantam Company; The Thew Shovel Company; Unit Crane & Shovel Corp.

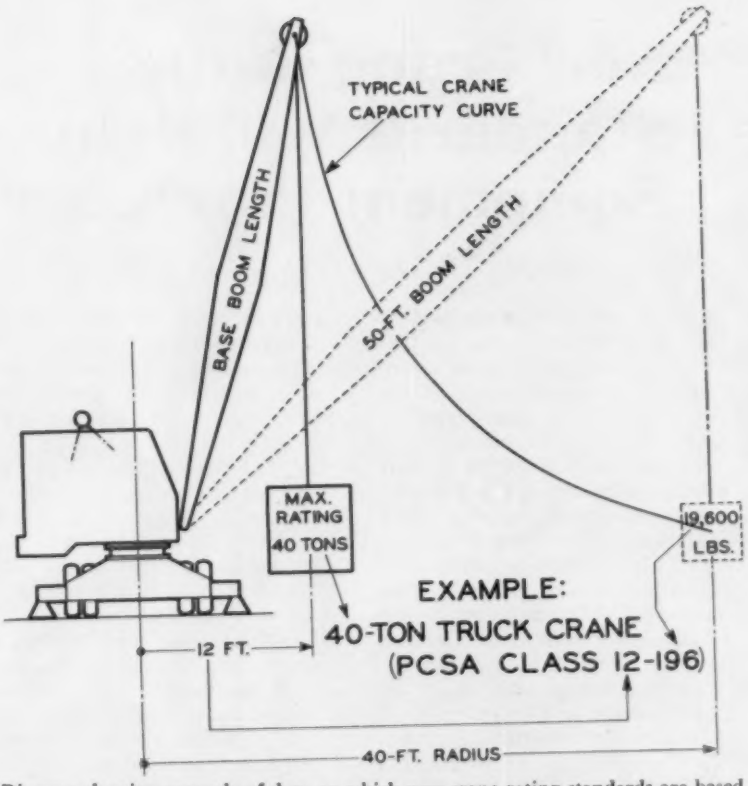

Diagram showing example of data on which new crane rating standards are based.

UNRETOUCHED PHOTO

*PAT. PEND.

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No deflection at the joint during load transfer

NOW! form setting time reduced to a minimum with Clark Wedge-Lok* the exclusive method of form joint.

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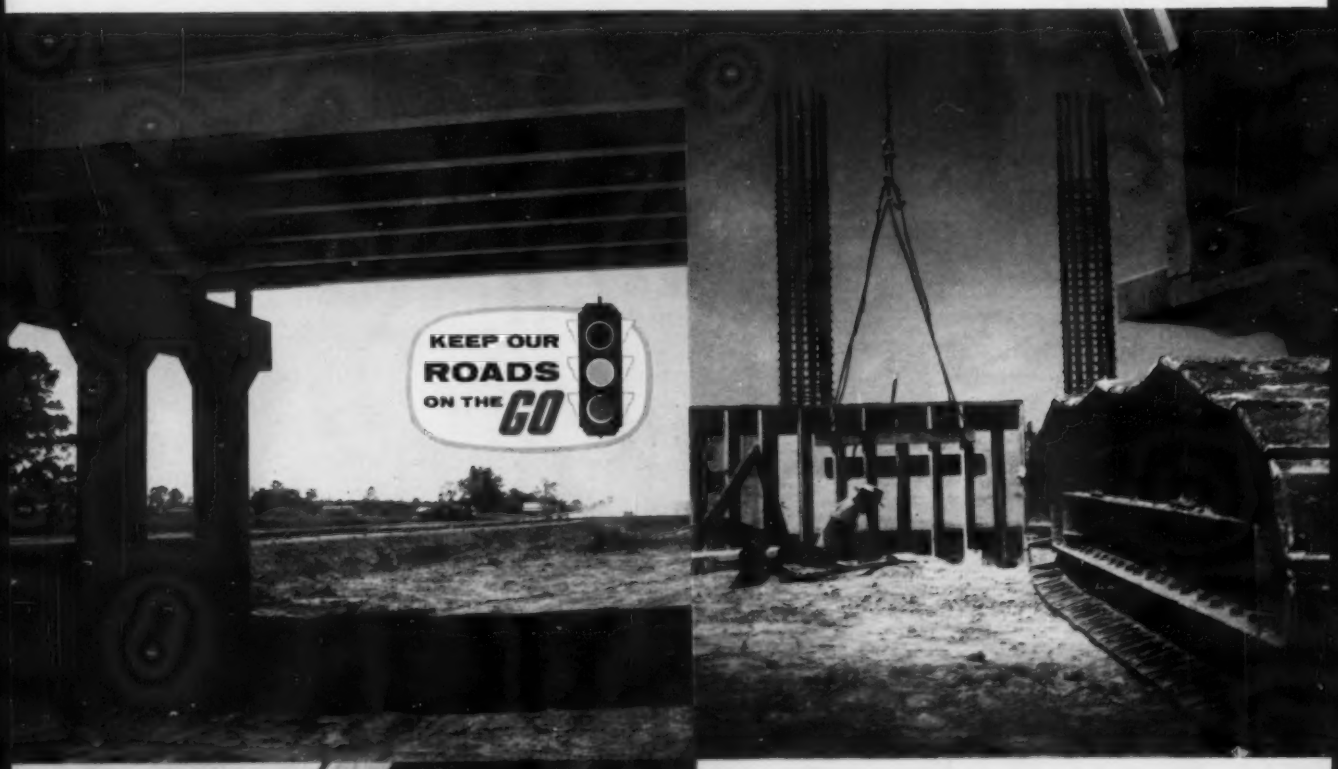
Indiana builds 1,500 new bridges... 1,087 miles of new Interstate Highways



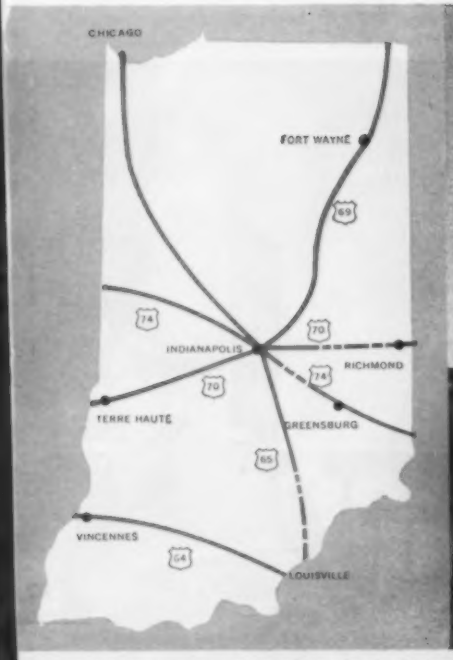
Upper left–USS Structural Steel, shown here in support of the bridge deck, is one of the most economical of all load-carrying materials. It has great strength, permits higher allowable working stresses, and is easily and quickly fabricated in all kinds of weather, substantially reducing construction costs.

Upper right–Tractor treads take a terrific beating day in and day out. USS Special Rolled Sections are produced to high-quality standards and can stand up to heavy punishment for a long time without replacement, cutting ultimate construction costs. In the background, USS TIGER BRAND Wire Rope lowers a crane load; USS DI-LOK Reinforcing Bars will aid in providing strong, stable support for a new bridge.

Left–More than two million tons of Blast Furnace Slag were used in constructing the western section of the Indiana East-West Toll Road. Air-cooled, crushed-and-screened slag was used as aggregate in the concrete column bents and pavement of this structural steel elevated roadway; and air-cooled, run-of-bank slag was used for erosion control along the banks of the Calumet River.

See inside

Indiana constructs new



This map shows the general location of Interstate Highways in Indiana. Dotted lines indicate completed highways. Almost all the main routes go into Indianapolis. It has more Interstate Roads leading into it than any other city in the U.S.

Interstate roads and bridges

with help of products from U.S. Steel

Mammoth road-building machines like these must be strong. For strength plus lightweight that increases operating efficiency, strategic parts of this equipment are made with USS High-Strength Steels—USS MAN-TEN and USS TRI-TEN. Control cables are of dependable USS TIGER BRAND Wire Rope.

Highway safety begins with preliminary road design. From a safe, smooth surface (concrete made with UNIVERSAL ATLAS Cement) to strong, long-lasting AmBridge Guard Rail, USS can be your single source of supply. Included in the complete line of USS highway safety products are tubular poles for lights, galvanized steel guard cable, galvanized steel sheets, USS VITRENAMEL enameled sheets for signs, and CYCLONE Fence.

Left–Indiana's many bridges like the one here on Interstate Route 65 are built with a variety of highway products such as: USS Structural Steel, USS DI-LOK Concrete Reinforcing Bars, UNIVERSAL ATLAS Cement. USS Steel H-Piles support piers.

Write for the *free* 54-page booklet, "Keep Our Roads On the Go." You'll find all the United States Steel products and services that will help you cut costs and speed operations in highway construction. United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

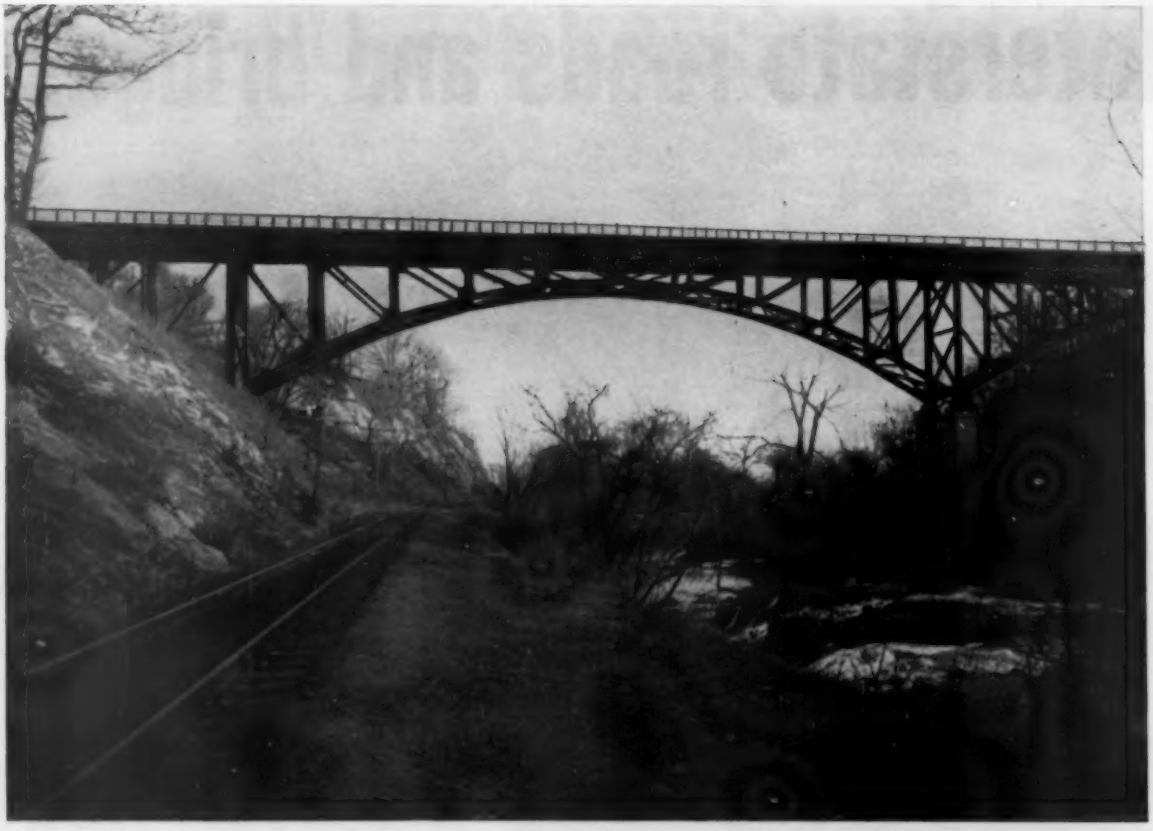
Construction for the Interstate Highway Program is moving rapidly in Indiana. 1,087 miles of Interstate roads and 1,500 bridges are scheduled. Of these, 817 miles of new highways and 103 bridges are under development. More than 165 miles of new roads and 453 new bridges have already been completed or are under construction, not including the Indiana Toll Road. Over $80,575,000 is being spent on the Program this year. The work is under the direction of John Peters, Chairman, Indiana Highway Commission, and G. M. Foster, Executive Director of the Indiana Highway Department.

Many kinds of highway products are needed to build Indiana's roads . . . and U. S. Steel offers a *complete* line of these products: Structural carbon steel, high-strength and constructional alloy steels for bridges; steel H-piles, sheet piling and tubular piles for bridge foundations; drainage products; cements for all types of concrete construction; slag; reinforcing bars and welded wire fabric; wire rope, cable, tubing and special steels for construction equipment; fence, beam and cable guard rail, steel sheets for signs . . . and dozens more.

USS, ATLAS, CYCLONE, DI-LOK, MAN-TEN, TIGER BRAND, TRI-TEN, UNIVERSAL and VITRENAMEL are registered trademarks.

United States Steel

The highway market is served by United States Steel, Pittsburgh, Pa., and the following divisions: American Bridge Division, Pittsburgh, Pa., American Steel & Wire Division and Cyclone Fence Department, Cleveland, Ohio; Columbia-Geneva Steel Division, San Francisco, Calif.; Consolidated Western Steel Division, Los Angeles, Calif.; National Tube Division, Pittsburgh, Pa., Tennessee Coal & Iron Division, Fairfield, Ala.; Universal Atlas Cement Division, New York; United States Steel Supply Division, Steel Service Centers, Chicago, Illinois.



Now New York specifies basic lead silico chromate in all coats of rust-inhibitive paint system

You can be *sure* that before any state changes a basic materials specification, evidence must be substantiated indicating superior performance.

Adoption by the New York State Department of Public Works of a rust-inhibitive paint system containing basic lead silico chromate pigment in all coats, is a case in point. The initial evidence for this decision was established by more than ten years of exposure testing by National Lead at its Sayville, Long Island, Test Station.

It was found that even without a finish coat to protect them, primers containing *M50*® basic lead silico chromate pigment endured ten years. And the *M50* pigment, unlike other rust-inhibitors, could be used in intermediate and finish coats as well as in primers.

Then the state obtained its own evidence by painting several bridges with basic lead silico chromate paints. One such job was the renovation of the Albany, New York, bridge shown above. It called for both shop-coat priming of new steel and spot priming of the old. And the intermediate and finish coats were properly applied in the Fall.

Pass field test with flying colors

New York State Engineers were more than satisfied . . . not only with the performance but also with the working properties, tint retention, and color uniformity of the basic lead silico chromate paints. On November 28, 1958, the Division of Construction of the New York State Department of Public Works issued new "Paint and Painting" specifications calling for basic lead silico chromate pigment *in all coats* of the typical rust-inhibitive paint system for highway structures. Today, state after state is following suit.

For information on basic lead silico chromate paints, consult your regular paint suppliers. For technical details on National Lead's basic lead silico chromate, *M50* pigment, contact National Lead Company.

M50® an **oncor**™ *Pigment... A Development of* **National Lead Company**

General Offices: 111 Broadway, New York 6, N. Y.

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AGC Contractors Hold Record Convention

See the Special AGC Newsletter in this issue for highlights of San Francisco convention, and next month's Roads and Streets for a more extended review.

Over 2,500 delegates and visitors attended the record-setting 41st annual convention of the Associated General Contractors of America held in San Francisco, March 21-24, a trade association whose 7,400 members—organized into 127 chapters and branches in every state of the union—perform the great majority of contract construction in the United States.

Government and industry figures on the program included W. A. Bugge, Washington state director of highways and co-chairman of the AASHO-AGC joint committee; Rep. Gordon H. Scherer (R-Ohio), member of the U. S. House of Representatives' Subcommittee on Roads; Bertram D. Tallamy, federal highway administrator; A. E. Johnson, executive secretary of AASHO; California State Senator Randolph Collier, a backer of that state's progressive highway program; Maj. Gen. W. K. Wilson, Jr., deputy chief for construction of the Army Corps of Engineers; Rear Adm. E. J. Peltier, chief of the Navy's Bureau of Yards and Docks; Dean Barron, assistant director, audit division, the Internal Revenue Service; Jean L. Vincenz, president of the American Public Works Association; C. H. Oglesby, professor of engineering at Stanford University; Robert L. Gordon, vice president and manager of the Bank of America.

Four of these speakers, Rep. Scherer, Mr. Tallamy, Mr. Johnson and Senator Collier, appeared on a panel to discuss the present status and future prospects of the federal-aid highway program. Panel moderator was AGC vice-president John A. Volpe, John A. Volpe Construction Co., Malden, Mass.

At the San Francisco convention, Mr. Volpe, who was the first federal highway administrator after the program was initiated in 1956, was installed as AGC national president. M. Clare Miller, of the roadbuilding firm of San Ore Construction Co., McPherson, Kansas, took office as 1960 vice-president.

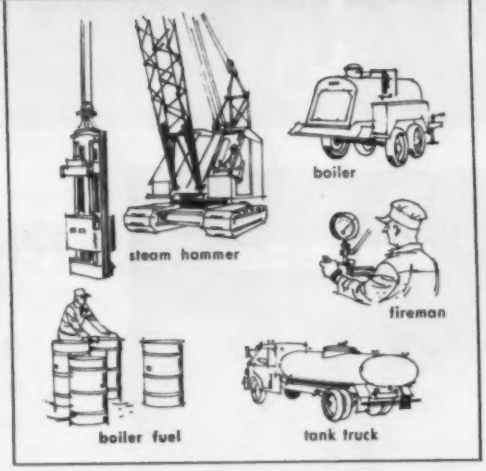
COMPARE... see why steam hammers cost more!

LINK-BELT SPEEDER diesel pile hammers

- Lower investment
- One-man operation
- Completely self-contained

VS.

steam-actuated hammers



By the hour, by the day, by the year, you're money ahead with LINK-BELT SPEEDER diesel hammers

A simple comparison between a *modern* Link-Belt Speeder diesel pile hammer and a steam (or air) hammer shows you the big difference in initial cost . . . operating efficiency. Steam hammers cost you more — and why shouldn't they? You have to pay for the extras: boilers or generators, tank trucks, firemen, greater fuel consumption. And you have to maintain these extras, too, with time, money and men!

With a better-designed Link-Belt Speeder diesel pile hammer, just one man controls both hammer and crane . . . from the cab. Setup is easy. Put hammer in leads, that's all! Hammer ratings up to 7,500, 18,000 and 30,000 ft.-lbs. per blow. For further details, see your distributor. Or write for Diesel Pile Hammer Bulletin No. 2582-A. LINK-BELT SPEEDER CORPORATION, Cedar Rapids, Iowa.

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LINK-BELT SPEEDER

Also builders of a complete line of shovel-cranes . . . ½- to 3-yd., 8- to 75-ton capacities.

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RIGHT ON SCHEDULE

Gyro-Flo powered CRAWL-IR drills average 400 ft. daily in Westchester Granite with 3-inch Carset bits

These three Ingersoll-Rand CRAWL-IR drills, each powered by a 600-cfm Gyro-Flo compressor, helped a New England Contractor to stay right on schedule in removing a million yards of rock for the Elmsford Section of the Cross-Westchester Expressway. Drilling holes with 3" Carset bits, each machine has averaged about 400 ft per day in hard Westchester granite. All tower positioning is hydraulically controlled and 12′ 3" boom swing permits drilling on both sides of the crawlers at a single setting.

The 600-cfm Gyro-Flo rotary compressors offer maximum economy and dependability—smoother running, smaller, lighter, virtually maintenance-free, with air temperatures under 200°F, low oil consumption and closer regulation at all loads from 0 to 100% capacity. Gyro-Flo units are available in 6 sizes from 85 to 900-cfm, for every air-powered job.

Ask your I-R distributor or engineer for complete information on the cost-saving CRAWL-IR Gyro-Flo combination.

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Editorials . . . in Brief

While some of our Congressmen want a stretched-out highway program, leaders in several states are pushing for a speed-up. Mindful of the urgency of road needs for an expanding economy, Maryland's governor Tawes has signed a bill setting up a crash arterial job—$330 million to be concentrated on 400 miles to complete the state primary network by 1965.

Massachusetts too wants its roads sooner and financing plans are afoot to telescope a billion dollars' worth of construction into four years instead of ten. Rhode Island would do its 14-year program in seven, with financing based on anticipation of federal apportionments. Pennsylvania has a bold $3 billion plan to complete its network in 12 years. Things are stirring similarly in Connecticut.

Not all these state programs may go over, but such action shows the deep concern over highways. Perhaps some of the fever will be felt in Washington between now and 1961 when Congress again takes up Interstate program financing.

Contractors have had an anxious eye recently on Congress over proposed legislation that would set up new rules for depreciation allowances and resale of equipment. The antiquated rules long in use have been satisfactory to most contractors, depending on how they are interpreted. Depreciation is a mighty important thing in a contractor's life—often more important than getting that low bid.

The low traffic death rate on freeways is one of the "selling points" in pushing for one-time completion of the Interstate network. But when new stretches of "I" roads are opened up, *will* the death rate drop? The turnpikes have an uneven record in this respect. Some have fatality rates little if any lower than the average for all roads. Others are two to five times safer. Enforcement is seen to be one of the keys, and the top speed limit too is apparently a factor.

It will be sad to see politically soft driver licensing and traffic law enforcement policies nullify the effort to build safety into the highways.

What's the matter with bridge decks these days? Why the early deterioration? A consulting engineer who is one of the top bridge designers asked us this question. His own observation: too little concrete over the reinforcing; unevenly positioned top steel; concrete placed and finished under poor control; de-icing chemicals get at the steel; long slender slabs designed with too little concern over deflection and vibration under traffic loads.

Whatever the factors, deck slabs aren't standing up as well as the adjacent road or street paving in many instances. One city engineer has asked the state to build heavier deck slabs with more concrete over the steel, for arterial bridges in his city. Many engineers are considering epoxy resins for concrete protection. Latex cement mortar is another development in protective materials. Meantime some decks are standing up well. Here is a good place to make a practical study, along with taking the obvious step of tightening up on construction procedures.

Would you lend ten thousand dollars to a contractor"? A Chicago bank executive asked this question of an audience of engineers the other day. His own answer was "Yes, if . . " Contractors are about the riskiest class of borrowers, he said, yet his bank usually wants no formal collateral. It looks at the contractor's character, and at how well the fellow knows his business.

Here's testimony of the personal integrity of the men who build the roads—a segment of the business community often vilified but less often given a favorable word.

Harold J. McKeever

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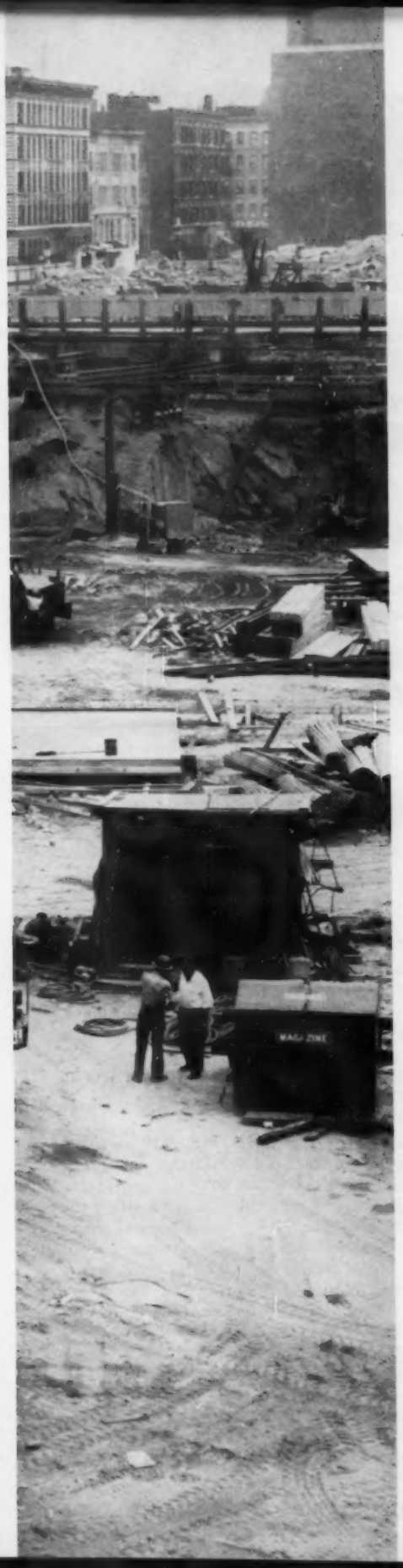

This job has required close coordination and tight scheduling of the work of rock removal, retaining wall and bridge erection, utility maintenance and other phases.

Trenching 12 Lanes Across Upper Manhattan

Roads and Streets Staff Field Report

One of the costliest concentrations of projects in the Nation's highway program is in full swing around the George Washington Bridge which spans the Hudson into New York City. The Port of New York Authority is undertaking a $183,000,000 project for traffic relief at this facility. The giant bridge itself is being given a second deck. Tying into it, new high-volume approaches will revitalize traffic flow between Upper Manhattan and metropolitan New Jersey.

This review focuses on one of the approach segments in the New York side—the contract section held by Brookfield Construction Co., Inc. of New York City. Beginning just off the New York end of the big bridge, this segment extends 1,500 ft. eastward across Washington Heights toward the Harlem River in Upper Manhattan. The contract amount—$6,708,000 for less than one-third of a mile—eloquently bespeaks the job's complexity. The geometrics are relatively simple: just a depressed freeway with four 36-ft. 3-lane roadways flanked by retaining walls. The construction, however, has called for use of the varied experience of a firm such as Brookfield which specializes in foundations, rock excavation, underpinning, retaining walls and similar "heavy" work.

The complete-package contract includes rock-all-the-way excavation between Cabrini Boulevard and Wadsworth Avenue; flanking walls; handling of underground utilities; and the multiple-roadway paving. Also in the job are the foundations for a $13 million bus terminal building that will utilize air rights over the expressway; ramps to the terminal; a

Sample of the underpinning and shoring required to carry utility lines at one stage. (Scene looks across the depressed roadway, at right angles to the expressway axis.)

pedestrian underpass connecting with the transit subway involving deep foundations in rock along existing subway tunnels; and new surface street bridges, with precast concrete girders.

Bidding Policy. In line with the Port of New York Authority's policy with complex projects, all items not expected to change greatly in quantity were lumped together in a Schedule III, "Unclassified Work," and bid asked on a lump-sum basis. This accounted for $4,928,000 of the job.

Schedule I for "Classified Work" was bid on a unit-price basis for items which included excavation, miscellaneous concrete, structure alterations and rubble stone work, totaling $1,307,000.

A separate Schedule II, "Classified Utility Work," comprised 98 items covering the locating, preserving and relocating of existing utility lines that stream across the right-of-way. This ran to $469,000.

Earth excavation was bid at $1.82 per cu. yd.; rock excavation at $7.10.

The Port of New York Authority engineers prepared detailed plans and specifications insofar as available subsurface information would permit. The contractor was required to prepare shop drawing for Authority approval for structural steel and other work involving shop fabrication. The Port authority engineers furnished a baseline and a benchmark. The company had to do its own surveying from these for construction lines and grades, subject to frequent checking by Authority engineers; also to record and report complete data on location of utility lines encountered.

Brookfield which specializes in heavy concrete construction subcontracted a substantial amount of work. Michael F. Breen & Son have the excavation and hauling; L & J Contracting Co. is handling the blasting; Jandeous Electric Co. the electrical work; Harris Structural Steel Co., Inc., the structural steel; Precrete, Inc., the precasting and tensioning of prestressed girders for two of the bridges; J. Stockinger the piping; Colonial Sand and Stone, the ready-mix for structures and foundations.

Blasting Procedures. Rock drilling and blasting are tightly controlled by the specifications. The photographs illustrate the congested area in which 139,000 cu. yd. of mica schist has had to be blasted for shovel or backhoe loading. The numerous

Continued on page 122

Practical Approaches to Expense Analysis

Contractors' Cost Controls—No. 4 in a Series

By James P. apRoberts

Cost Control Specialist, Chief Estimator, Pomeroy and Associates
Pasadena, California

The previous articles in this series have introduced the general subject of cost controls—including sources of income—as they apply to a typical roadbuilding contractor.

The article No. 3 last month (March issue) on general expenses versus profit control was meant to serve as an introduction to the accounting phase of cost control. In that article the basic fundamentals of accounting or cost keeping were briefly reviewed, in terms of their application to situations commonly encountered by a typical roadbuilder.

It was also pointed out that a close relationship should be developed between estimating and accounting procedures, so that the roadbuilder can have bona fide cost information for use in preparing his bid estimates as well as in determining his operating costs.

Compilations of cost data are of the greatest value when the same cost units or work items are used wherever possible, in preparing the job cost studies or reports for either actual jobs, job proposals or estimates.

When the roadbuilder who follows this practice is the successful bidder, he is in a position to put the findings and assumptions of his estimate to work for him without having to lose a great deal of time and waste motion in completely re-examining the project. He can put the findings and assumptions of a more realistic estimate to work without so much delay. On jobs where the time allowed for completion of the work is apt to be close to the actual production time, this can be the way to get off to an early rolling start. This in turn can mean finishing before heavy penalties have to be assessed because the job was dragged out beyond the completion date.

Likewise, with uniform unit cost data, the project manager or job superintendent are in a better position to get a first-hand understanding of the nature of the work ahead, thanks to the picture that has already been drawn by the estimate. These men are also in a position to know more about the actual and anticipated costs of the work and to try to make savings as well as to get the job done.

In turn, the accounting department is ready to "follow the job in the field" because it has a ready-made schedule of accounts. This schedule of accounts is understandable because it has been based on either previous experience or the estimate of conditions which will apply for this job.

This cooperation between accounting and estimating is also invaluable when the actual field methods and field cost study experience indicate that changes should be made—changes in either the estimated costs for a given work item or the designation and breakdown of that particular item. Cost changes of this kind are bound to occur because of several reasons:

1. New type or class of work is undertaken.
2. Introduction of new products, methods or equipment.
3. Changes in union jurisdiction and work rules.

Continued on page 144

Figure 1—A result of contaminated grease. Many contractors today are incurring such equipment wear because of a poor follow-through on their greasing and oil changing routine, wrong lubricants, or both.

Equipment Maintenance

For each contractor's pattern of operations—and each individual job—this type of lube and service rig will efficiently support a preventive maintenance program. This van-type truck (Aro design) assures complete weather protection.

Choosing the Right Mobile Lube Equipment

The simplest forms of portable lubrication equipment are the conventional grease gun and the familiar "squirt" can of oil.

Both are still in wide use today and are adequate for a limited field of application. Their limitations of capacity and flexibility confine their use to applications where economics do not justify the investment in power dispensing equipment. Their use also requires that bulk lubricant supplies be within easy access and equipped with suitable filling devices.

Large lubricant requirements preclude time-consuming hand application since the cost of the labor is considerably more than the cost of the lubricant. The continuing rise in labor costs, as well as the high price of modern precision machinery, has high-lighted the necessity for the proper application of high quality lubricants in the shortest possible time.

Many of today's complex multi-purpose machines operate far from a base of supply under severe conditions. To perform at top efficiency hour after hour, they must receive their daily diet of fuels and lubricants. Circumstances may vary but the supply and servicing needs are always the same. Developments in mobile fuel and lubrication equipment

Figure 2—Lubricating equipment in the field. (Photo courtesy Quiggle and Sutliff.)

have provided the means to meet these needs on time, at the right place, in clean condition and in the right amounts.

Preventive Maintenance

Preventive Maintenance is the first and foremost requirement in the proper care of equipment. To ignore the basic concept of Preventive Maintenance is to invite unnecessary repair with its ever-present companion, high cost of down time.

Preventive Maintenance can be described in five short words, *stopping failure before it starts.* Proper attention to lubrication, minor adjustments and repairs is the surest way to prevent the repairs from becoming major items of overhaul. Definite scheduling of maintenance procedures with proper interested supervision and conscientious execution of the work will pay for themselves many times over in efficient, trouble-free operation of equipment. The basic and most important tool in a program of Preventive Maintenance is *proper lubrication.*

The proper selection of lubricants is the foundation of an effective program. However, misapplication, mishandling or contamination will quickly nullify the best of selections.

A high-speed heavily loaded roller bearing won't operate very long with a charge of tacky gear lubricant.

The built-in excellence of a lubricant is useless when improper care permits the entrance of dirt, water and other contaminants into a critical bearing or a close fitting hydraulic system with resultant rapid wear and failure.

The results of lubricant contamination are quickly evident. Note the remains of the roller bearing seen in Fig. 1 which failed after only 30 hours' operation because of dirt-contaminated grease.

Maximum benefits from a program of Preventive Maintenance require the cooperation of management, supervision, shop forces and the operators. Like the proverbial chain, Preventive Maintenance is only as strong as it weakest link. The equipment manufacturer and the lubricant supplier know well the advantages of PM, and are willing cooperators in establishing a program to suit the contractor's operations.

Heavy Construction Industry

There are few industries where Preventive Maintenance and its major tool, Lubrication, is of greater importance than in the heavy construction industry. Its equipment is seldom idle, almost never stationary, and requires daily attention at or near work location. The nature of the operation has dictated that effective lubrication can best be accomplished by the use of mobile dispensing equipment. This industry with its vast amount of equipment is the major user of mobile lubrication equipment.

Unlike many industries, the contractor must bid for his work. His estimates of cost must be based on sound judgment and good business practice in order to realize a profit rather than a loss. Investments in heavy equipment run in the millions of dollars for individual contractors with single units costing as high as $90,000. The magnitude of such investments make it imperative that equipment operate at a constant high level of availability and performance.

It is not uncommon for a $10,000,000 project to involve 50 to 100 pieces of major equipment. The down time of a single piece will run from $25 per hour upward. Failure of a critical shovel or loader will result in idle time for other equipment that quickly runs into thousands of dollars of production loss. Can any contractor, big or small, afford the

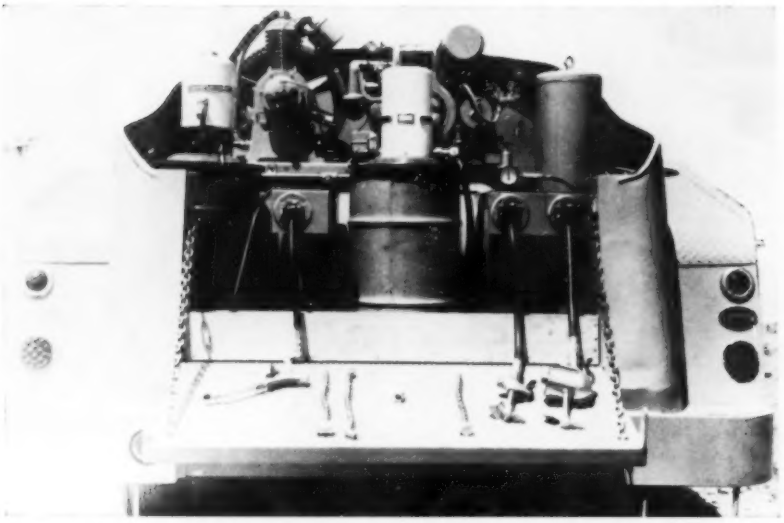

Figure 3—A tank wagon modified to serve a dual purpose. (Photo courtesy J-8 Equipment and Supply Company.)

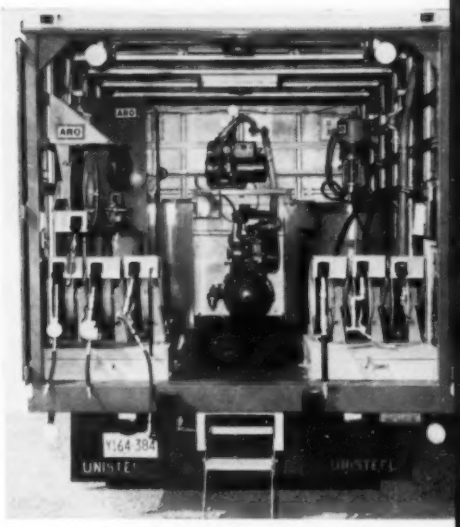

Figure 4—A van type lube truck provides both complete service and protection against the weather. (Photo courtesy Aro Equipment Corp.)

"luxuries" of poor maintenance and inadequate lubrication?

Every contractor wants the maximum capacity from his equipment, and in many cases, a little bit more. Often to accomplish this he will modify his equipment to carry higher payloads. This constant heavy work under severe operating conditions demands the best in lubrication practice to keep wear to a minimum. The farsighted contractor has recognized these requirements and has acquired the proper lubricants and dispensing equipment tailored to fit his particular type of operation.

The Lube Truck

The contractor has found by experience that lubrication by hand is costly and time consuming, particularly when lubrication is done on an overtime basis by the machine operator. The well-equipped lube truck with a competent operator provides the surest method of lubrication at a minimum cost.

Fundamentally all lube trucks perform the same function regardless of their physical appearance. They must be able to service the equipment on a daily basis, or more frequently when necessary, regardless of the location of the equipment in the field.

The following items will be found on practically all well equipped lube trucks whether built commercially or by the contractor. Modifications in detail vary to suit the individual contractor's requirements.

1. Drums or tanks containing the products of a simplified lubrication plan with pumps of proper capacity for dispensing them. Auxiliary drum covers provide weather and contamination protection as

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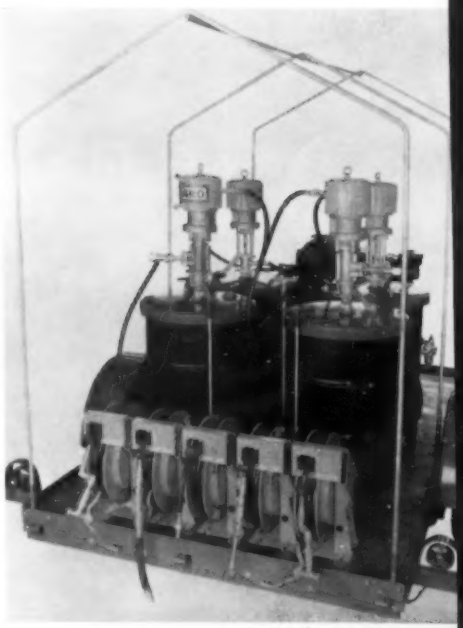

Figure 5—Maximum mobility with minimum cost is provided by a trailer-mounted rig. Note the tarpaulin frame for weather protection. (Photo courtesy Aro Equipment Corp.)

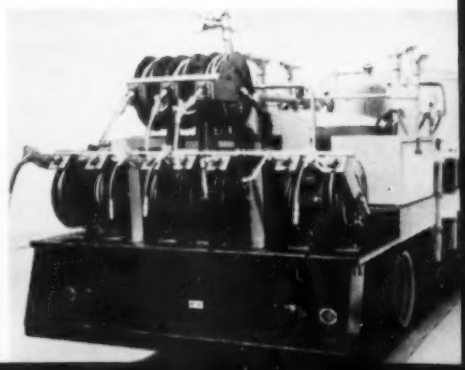

Figure 6—A modern lubrication truck. Note the step-down bed frame which provides easy loading of drums, and additonal hose reels for special lubricants. Courtesy of Lincoln Engineering Co.)

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Contractor Earns Bonus on Big Downtown Job

Forty-three block project done ahead of schedule by tight planning, good equipment, "cooperation from everybody"

When a city undertakes to repave virtually the entire central business district street system, you immediately say, "Someone's asking for a headache." Traffic is bound to be disturbed, and the public inconvenienced. Those who don't cuss City Hall will throw stones at the contractor.

Such a turn of affairs might have developed recently in Abilene, Texas. This city has just wound up a big downtown street program—real slam-bang, 43-block one. But the job was done, believe it or not, with hardly a complaint. The answer in Abilene lay in careful advance planning and job scheduling, cooperation by all parties including the utility companies—and good performance by a contractor who had modern equipment and an understanding of the public service aspect.

The Abilene program included new storm sewers and sidewalks as well as complete street reconstruction. The revamping job was voted as a means of revitalizing the city's "CBD", the program being conceived and brought to reality by a group of citizens sparked by city manager Henry B. Nabers. Bond financing and assessments produced $1,407,000 for the work.

The contract low-bid by Texas Bitulithic Co., Dallas, was awarded following a study of the best way to handle the project from the public standpoint. A detailed construction schedule was made part of the contract documents. The requirement was to maintain access to all business addresses at all times, from the front or at least from an alley entrance. This had to be done in the midst of all the work sequences: old pavement removal, utility work and new paving. Utilities included storm sewer, sanitary lines, water, telephone, gas and electric power.

The contract carried a $500-per-day penalty-bonus clause, with a 250-day working limit.

Further, the contractor had a definite time interval for his utility work, *after* old pavement removal and *before* beginning new subgrade operations. During this interval (two days per block) the following specific operations were to be accomplished, with the appropriate agency cooperating:

City water taps to be made, new service lines laid, valve boxes set.

Conduits to be installed for traffic signals at all intersections.

Gas lines to be placed across streets at alleys, and service lines relaid.

Downtown Abilene, Texas, as it looks today. Yesterday, this central business area like that of many was in need of blight eradication. Dilapidated paving, high curbs, open drainage, worn sidewalks were replaced with least business disturbance. The new paving is expected to help merchants and business houses keep the area flourishing.

Telephone cables to be raised, lowered or otherwise taken care of, working in conjunction with storm sewer installation.

New complete underground circuit to be installed for street lighting.

The extensive new storm sewer installation with deep-set lines up to 66 in. diameter had its own schedule. Subcontractor P. E. Sorenson Co., of Dallas used four pipe laying crews to do this advance-of-paving job, completed in 67 calendar days.

The city water department did its part by fast work replacing distribution lines with larger ones, this work going on during the sewer construction.

The pavement design for the 71-ft. new street width consisted of 6 in. thickness of soil-cement base and a 6-in. unreinforced portland cement concrete pavement. The p.c. concrete pavement bid was accepted on a basis which considered first cost, maintenance and service factors.

After removal of the old pavement, the black silty clay subgrade material (P.I. about 20, Liquid Limit around 34) was found to be saturated and very spongy. The top 6 in. was stabilized with 2 percent of lime by weight. Lime was applied in a slurry form to avoid dust nuisance, mixed with a disc harrow and a Seaman Pulvi-Mixer, and compacted with sheepsfoot and pneumatic rollers.

Soil-cement specifications gave minimum cement content for any base material chosen, as might be established by the Standard ASTM wetting and drying test for soil-cement, D559-557, with a minimum 7-day compressive strength of 300 psi.

The contractor elected to use a granular waste material from a commercial gravel plant, with a typical analysis as follows: 90% passing ¼ in., 15-25% passing No. 40, 2-5% passing No. 200. The ASTM wet-dry tests on this material indicated a 5.5% cement content by volume (4% by weight) and optimum moisture of 6.5% with a compacted density of 135 lb. per cu. ft.

The contractor set up a Pioneer Continu-Flo pugmill mixer at the materials source and processed the material with the cement and water at this central plant, hauling the soil-cement to the construction site in dump trucks. The soil-cement was spread in a uniform layer on the lime-stabilized subgrade using a Pioneer asphalt spreading machine.

Compaction was obtained with a small crawler-type tractor with street plates, followed by a 25-ton

Placing the soil-cement mixture with a Pioneer asphalt paver. A tractor is helping with compaction.

pneumatic roller. Following final blading, an emulsified asphalt curing seal was applied.

During the job, the contractor was allowed to reduce the curing time required on the soil-cement base from 7 days to a 4-day period. Using Type III cement, the 7-day compressive strength tests averaged 660 psi; 4-day strengths, 498 psi. In-place-density tests together with compressive tests on molded specimen were used for quality control of the soil-cement base.

The 6-in. unreinforced concrete pavement was designed for sawed transverse and longitudinal contraction joints. Both Type I and Type III cement were used in the concrete pavement. Placement began normally in mid-afternoon, the contractor running to around midnight, this pouring being selected to aid curing and also to minimize traffic problems.

A dual-drum paving mixer received dry-batched materials from a local ready-mix plant, with batches hauled to the mixer in compartmented trucks. Two Rex finishing machines were used, one 24-ft. and one 12-ft. width. The wider machine, for outer lanes, was fitted with notched screeds to form 5¾ in. integral curbs. Joints were sawed from 8 to 14 hours after placement depending on curing conditions and using three saws.

A few uncontrolled contraction cracks developed outside of the sawed joints when Type III cement

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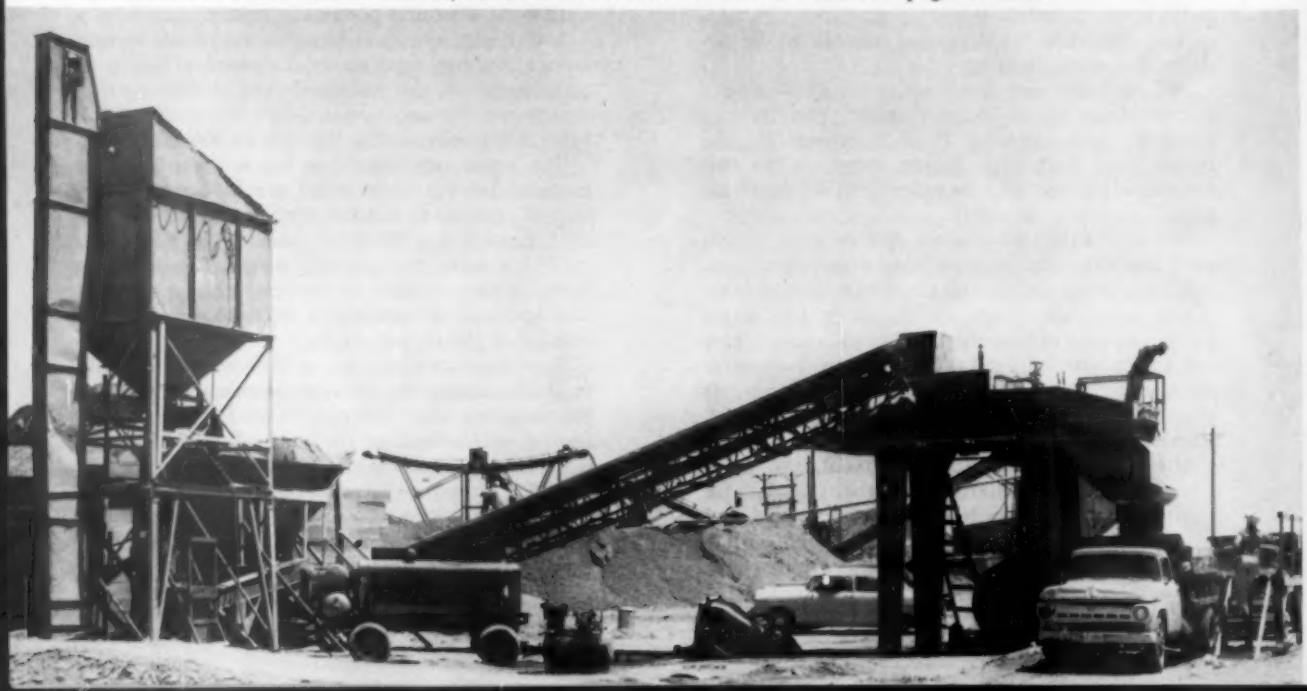
Soil-cement for street base was centrally mixed in this Pioneer Continu-Flo Plant with pugmill mixer.



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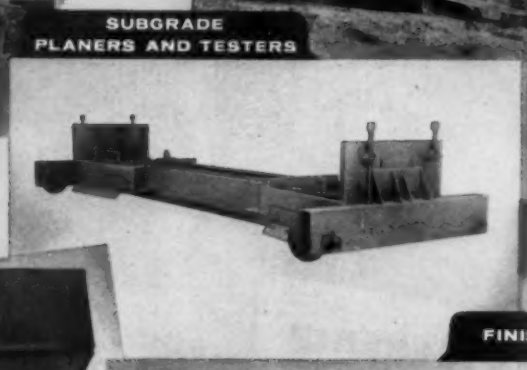

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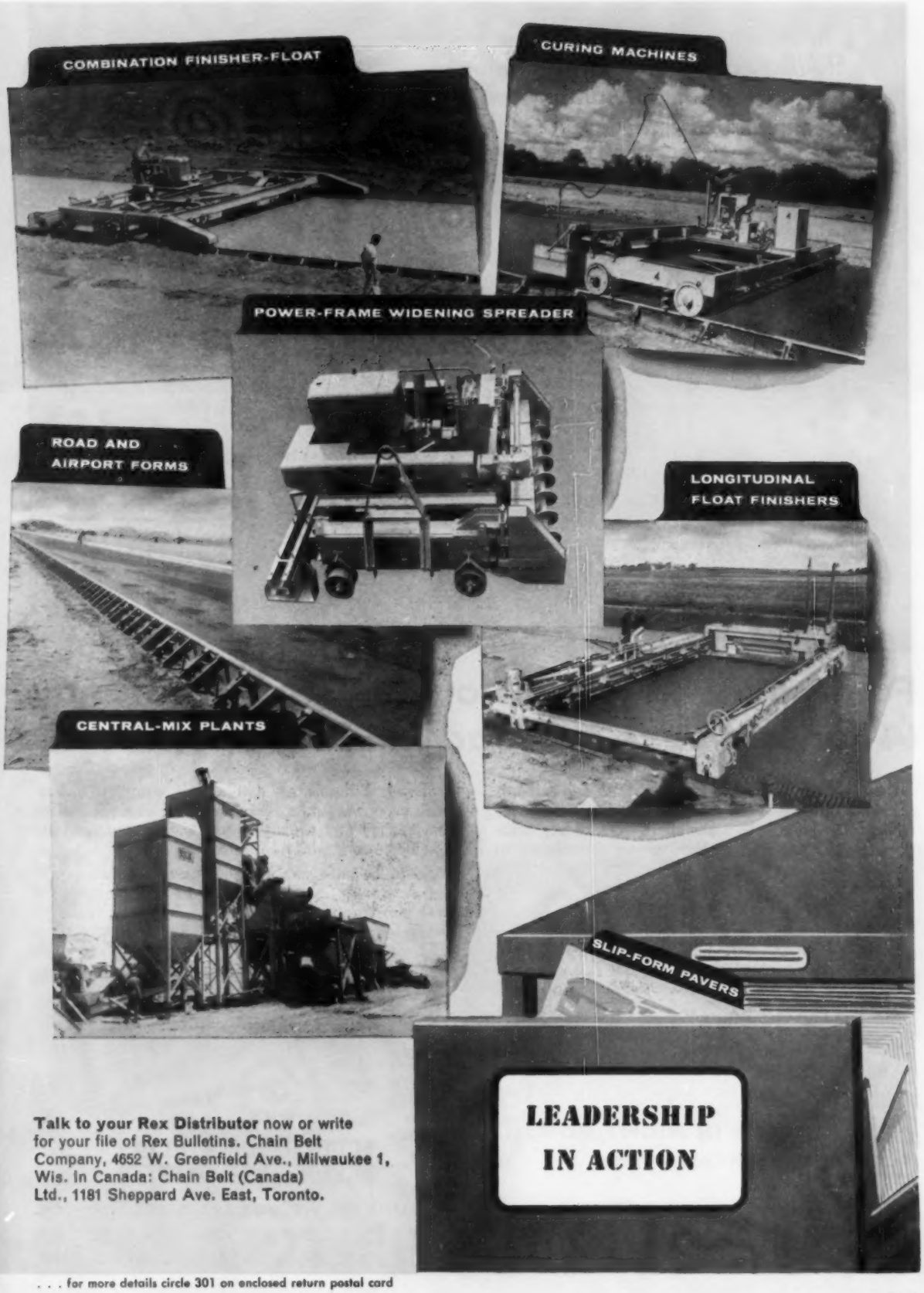

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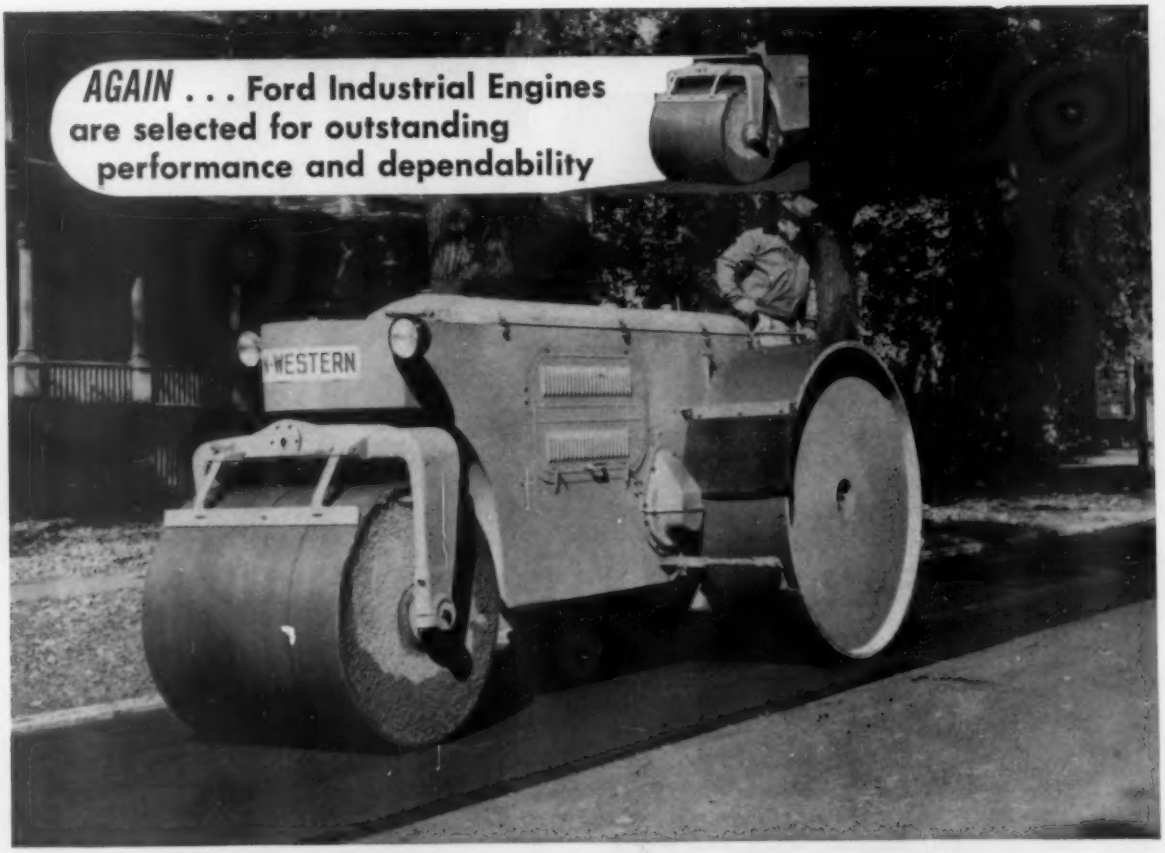

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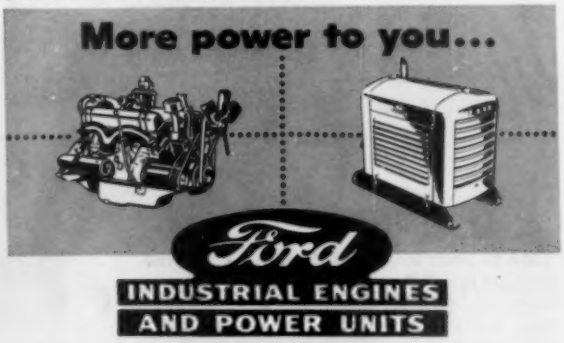

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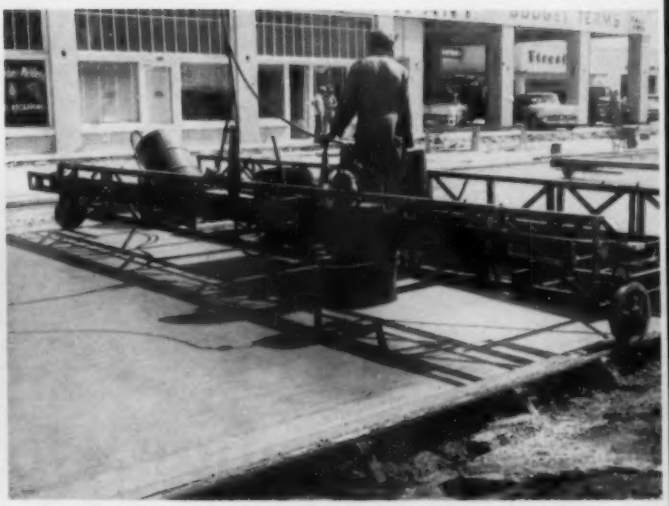

Placing of concrete was done with standard 2-lane road paving equipment, one side of a street at a time.

CONTRACTOR EARNS BONUS

Continued from page 68

was used, in the concrete placed during morning hours. This was remedied by keeping the base course wet for at least 24 hours ahead of paving operations and using a white pigmented curing compound rather than the unpigmented type. However, there was no tendency for random cracks to occur when using Type I cement with ordinary curing compound when pouring operations were begun in mid-afternoon or later, on a pre-wetted base course. In this connection, it is interesting to note the average 7-day flexural strength using Type III cement was 723 psi for morning pours, 908 psi for afternoon pours. With Type I cement, morning pours averaged 663 psi, afternoon pours 752 psi. (Specifications required a mix of not less than 5 sacks, and a 7-day flexural break of not less than 650 psi.)

Extensive concrete sidewalks (4 in. on compacted sand subgrade), were black pigmented by applying 3 lb. per sq. yd. of a magnetic black oxide, with 2½ lb. per sq. yd. of silicon carbide grit to give the non-skid texture. The black oxide and the grit were spread uniformly over the fresh concrete and

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A dual-drum road paver was supplied with dry-batched materials from a local ready-mix company. One paver sufficed to maintain the desired pace.

10 Miles of Tough Trencher Going

When extensive shoulder drains must be installed along a highway grade, should the lines be placed during the grading? Or after the grade has been fully compacted and dressed out—as was done on the Ohio project here pictured?

There is much to say for the latter procedure. The contractor is then free to plan full-speed scraper and bottom-dump hauling and layer compaction, knowing that there are no drain pipes needing protection. From the engineer's standpoint, cutting of the trench at a later date, placing pipe and backfilling, when properly done, create the least disturbance to the roadway foundation.

Trenching was a major consideration along the 5.0-mile segment of Interstate 75 (US 25 relocation) near Middletown in southwestern Ohio during the 1959 season. The joint contractors DeSalvo Construction Co. and S. A. Ruebel, had the job of trenching along virtually the entire project length for four parallel drain lines. The lines consisted of one in the outer and inner shoulders of each dual roadway, along with diagonal ditch outlets. The engineers required this extensive drainage because of the flat to gently rolling terrain and the dense soil moisture employed in the grading. Six-inch clay tile —open butt jointed, as in ordinary farmland tiling— was specified, with trenches to be carried down to about 4 ft. below top of pavement for the most part.

DeSalvo Construction Company's crew, which took on over 51,000 lin. ft. of the tiling, knew that it was in for some difficult trenching. The reason was the fact that the freshly built grade consisted largely of limestone, shale and clayey material. This mixture out of the job cuts, while varying somewhat from station to station, couldn't be anything else but tough to trench through. Considering the heavy construction hauling over the grade, and also the high-density specification (96 percent, standard AASHO, for this soil) this material was interlocked into an extremely tight mass.

Trenching work along the finished grade began late in the 1959 season and was done before winter shut-down. This operation developed into quite a show of ability for the modern high-production trencher. DeSalvo put a Cleveland J-40 with International diesel engine on the work. The machine hit some bad days, where the rock constituent of the material was high. But on most days it was able to cut 1,800 to 2,000 lin. ft. of trench (18 in. wide by 24 in. deep or deeper) per 9-hour day.

As could be expected, such trenching was "hell on teeth." Teeth replacement was however not beyond the rate anticipated in bringing this machine in. Stoppages for any cause, including manual digging away of occasional large rocks encountered was reduced to a fast routine. The two helpers when not meeting such emergencies routinely kept the trench shoveled clean and set tile.

The foreman checked the trencher travel and cutting depth with the help of sighting crossbars, mounted on temporary posts along the shoulder. Tile handled off the delivery trucks was set along the trench line with care, so that the tile sections could be picked up and placed in final position with the shortest manual movement.

The trenches were backfilled by dumping ⅜ in. pea gravel from Maxon Dumpcrete equipped trucks (on hand for concrete work) or other available trucks.

Vincent DeSalvo is in charge of this job for DeSalvo and James H. Raschig for the Ohio Department of Highways, Middletown district. The concrete pavement and surfaced shoulders will be placed in the job during the 1960 season.

Trenching for drain tile through supercompacted shoulder grade—material that also had been hauled over, through-out many months of grading work.

Proving that a modern trencher can often handle extremely rocky, densely compacted material—a Cleveland J-40 in action on Ohio Interstate 75 project.

← One of two 4-vehicle processions which handled over 100 big structural units for Interstate road bridge projects in northeastern Ohio. The equipment assembly was designed for multiple-tire load distribution and for maneuverability over back-road turns and hills.

Big Girders Take Special Trailer Handling

The girder here shown en route and awaiting setting is one of the structural units which required special handling for delivery and erection at Paine Creek Bridge, near Painsville, Ohio. The 25-ton girders were by no means of record weight or length, but the hauling task nevertheless is worthy of note because of the growing number of bridges that call for such handling in the national highway program.

The pair of dual roadway bridges span a deep creek bed within the Horvitz Co. contract segment of Ohio Route 1. Each bridge consists of six lines of girders in a three-span continuous system. Maximum shop fabricated lengths was about 120 ft., or long enough to require some route planning and clearance checking—and also to justify the services of a cartage specialist contractor. American Bridge Company, the superstructure subcontractor, employed the services of Cleveland Cartage Co., veterans in this business, for trundling the girders from rail siding to jobsite.

The outfit moving over an Ohio secondary highway in the photos began with a tandem tractor pulling a dual-axle lowboy on which was mounted a bolster set on a turning plate. This 16-tire assembly carried the front end of the 120-ft. girder. The girder was safely braced with A-timbers and wire rope slings, anchored tight with ratchets.

At the back end, the girder was carried on a specially designed dolly also equipped with bolster on a turning plate.

Maneuvering the rear dolly was a rear tractor which managed turning by means of a connecting tongue framed into the dolly. The rear dolly was hitched back of the rear tractor for the return trips.

A pickup truck carrying flags and a flagman head the procession, and a second pickup brought up the rear. A large rear sign on the rear tractor warned oncoming motorists of the oversize and overlength load, in accordance with Ohio special permit requirements.

Two such outfits made the hauls for American Bridge Company bridges, supplying bridges on three contract sections of Route 1 during the 1959 season. Each crew usually was able to make several 20-mile-average round trips per day.

The critical problem for these hauls wasn't height, but length and ability to make some sharp turns into back roads. Hauling was not permitted to begin until after the 1959 spring thaw period, due to the possibility of damaging the roadbed and shoulders. The Ohio division of highway bridge department cooperated where necessary. Special permits were issued by the Ohio state highway patrol.

Cleveland Cartage Company officials in describing this operation spoke with pride in the firm's 45 years of experience in handling difficult cartage assignments. Safety is a constant preoccupation with the entire personnel. Part of the safety technique is to keep worker and driver teams intact. For the hauls here described, the same crewman stayed with the equipment, the front tractor driver always in front, and rear driver always in the rear. Each man knew his job from this intensive specialization.

Along with hauling girders for these highway jobs, Cleveland Cartage also trailered in erecting

Continued on page 83

new equipment review

Looking for new ways to get lower costs, *more profit* on your excavating, loading, erecting, off-road hauling, or paving operations? Then take another look at the new machines and methods reviewed here. These are only a few of the many new sizes and types of equipment recently added to the bigger-than-ever Koehring® line.

Long identified with heavy-duty equipment design *and quality,* Koehring has *doubled* its line in these last few years through a concentrated program of new product development. This program is being continued. So, *keep your eye on Koehring* for new opportunities to cut construction costs . . . and get *more work capacity* . . . earn *more profit* per dollar of equipment investment! For up-to-the-minute facts and figures, your Koehring distributor is the man to see. *Why not call him today?*

KOEHRING
DIVISION OF KOEHRING CO.
Milwaukee 16, Wis.

In Canada:
KOEHRING-WATEROUS LTD.
Brantford, Ontario

30-TON 330

30 to 120-ft. boom . . . 150 ft. with jib

Here's *extra* capacity, *extra* reach you can use with complete safety. Boom-angle indicator and operator reference guide show max. safe load capacity at every boom length and angle. High-strength pin-pad connected boom permits "2-man" boom-length changes. Power-lowered A-frame removes counterweight. Boom, outriggers also removable for roading. The 330 increases Koehring line on rubber to 8 models: 15, 25, 30, 35, 45, 55-ton truck cranes and 15, 25-ton Cruiser® cranes.

15 TON DUMPTOR

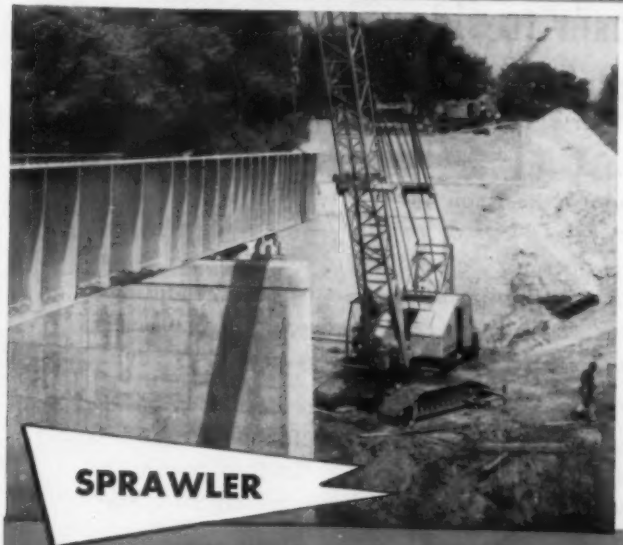
has pivoting seat . . . 2-way controls

No-turn shuttle hauling is more efficient than ever! Big, new 15 ton Koehring Dumptor® brings you 30,000 lb. payload capacity . . . 24 m.p.h. speeds in *both* directions . . . *plus* 2 sets of controls at pivoting seat. Operator always faces direction of travel. There's power steering . . . constant-mesh transmission . . . hydraulic speed-range clutches . . . torque-converter drive . . . instant gravity-dump, or *controlled*-gravity with hydraulic cylinders. A Koehring 8 ton Dumptor is available, too.

SKOOPER

revolutionizes digging . . . loading

Full-revolving, free-swinging Koehring SKOOPER® digs, hoists, swings, dumps . . . then swings back to digging position *without traveling*. Twin hydraulic rams crowd the 2-yard bucket along smooth 7-foot level cut from *"stand-still"* position . . . or cut at any angle of bank slope. Eliminates high track or tire maintenance of conventional drive-in, back-out, skid-turn loaders. 3 types interchangeable buckets: rock . . . re-handling . . . and general-purpose. Excavator-crane convertibility.



SPRAWLER

outlifts its own weight by 14%

With pivoting outriggers sprawled into position, 545 SPRAWLER™ lifts up to 90,000 *lbs.* (Weighs approx. 79,000 lbs.) Raise pedestals for ground clearance, or remove pedestals and swing outriggers against crawlers . . . and the 545 walks with 61,500-lb. load! Has 40 to 120-ft. pin-pad connected boom (with angle indicator) . . . max. 150-ft. boom-and-jib. Strips for transport to approx. 47,500 lbs. *with crawlers intact.* 8 other Koehring crawler models: 10 to 95 tons (⅛ to 3-yards.)

34-E TRIBATCH

paves half mile of highway a day

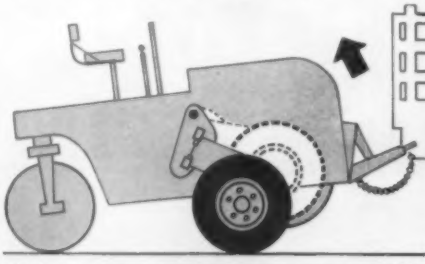
That's right! 2,580 lineal feet of 24-foot-wide, 9-inch-thick concrete pavement can now be laid in a 10-hour day with one 34-E paver — the new Koehring 3-compartment TRIBATCH! You get 43% more output than with dual-drum 34-E — and with no change in your present batching, hauling, finishing equipment. Secret of high TRIBATCH output is in the continuous production of 3-compartment drum, which produces approx. 2 batches (74.8 cu. ft.) every minute.

. . . for more details circle 340 on enclosed return postal card

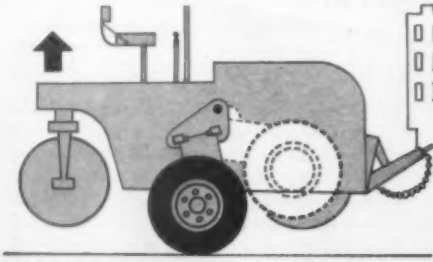
In Galt, Ontario, busy Buffalo-Springfield KT-8 works and runs on fast schedule. Towing wheels, hitch, remain intact — an important time-saver on scattered job assignments around town.

Head-on view shows how fold-away wheels let Buffalo-Springfield KT-8 roll within inches of side-obstructions . . . reduce or eliminate hand-tamping.

To make change from work position to travel position, hinged towing wheels swing forward . . .



Hydraulic power applies down-pressure on wheels . . . lifts front-end to height of truck-hitch . . .



After hitch is secured, more down-pressure is applied till balance point is reached. That's all there is to it!

fold-away towing wheels on KT-8 roller let you work closer to side-obstructions... make faster job-to-job moves

Towing wheels on the 4-6 ton KT-8 roller *fold away* — and *out of the way* — into main frame. Gives operator a clear view of his work. Lets him roll within *inches* of abutments, poles, buildings, fences . . . without removing towing wheels. No other roller on the market offers you this advantage.

Raising and lowering action is hydraulically powered . . . eliminates need for blocking, and jacking. You switch from rolling to towing in a matter of *minutes*. Saves time, effort. Safer, too!

Learn more about this compact little workhorse. Write for tell-all specifications, or call Buffalo-Springfield® distributor.

R&S 83

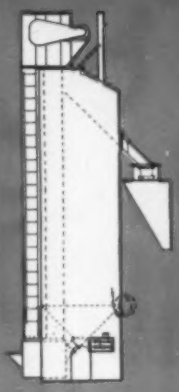
BUFFALO-SPRINGFIELD COMPANY

SPRINGFIELD, OHIO (Division of Koehring Co.)

Also: FLAHERTY SPREADERS, SWEEPERS • STANDRILL-KEYSTONE DRILLING MACHINES

. . . for more details circle 341 on enclosed return postal card

THE JOHNSON "GOPHER" OPERATES AS A SINGLE REMOTE-CONTROLLED PLANT—OR AS THREE INDEPENDENT UNITS:

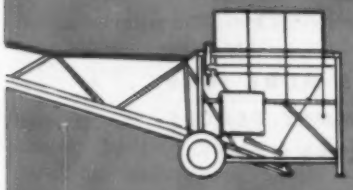


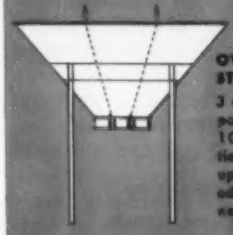
BULK CEMENT PLANT ON WHEELS

285-bbl. Porto-Silo, 8-ft. dia. with 180-bbl.-per-hour bucket elevator. (375-bbl., 9-ft. dia. silo also available.) 4,000-lb. cement batcher.

PORTABLE AGGREGATE BATCHER

6 cu. yd. unit. Three 12,000-lb. weigh-beams. Electric control panel. Cable, plug-in connections to all motors. 24-in. belt conveyor.





OVERHEAD STORAGE BIN

3 aggregate compartments. 40 or 100-ton capacities. Quickly set up. No complicated structural work necessary.

60 to 70 cubic yards an hour

AT MINIMUM INVESTMENT IN PLANT EQUIPMENT

Here's your opportunity to cut aggregate and cement batching costs. On one-stop operation, the Johnson "Gopher" weighs out 60 to 70 cubic yards an hour — big output for only a minimum investment in batch plant equipment!

Pick-up-and-go portability

There's no complicated field assembly. All wiring, piping, air lines have pre-fit couplings and connections for quick, easy hook-up or disconnect. Any time you're ready to move to next job, just pick up and go! Complete wheel, axle, towing assemblies on cement silo and aggregate batch unit make moving easy. Quickly sets up anywhere. Flexible, too! Makes a complete one-stop batch plant — or operates as 3 separate units.

Everything pre-assembled

Big-capacity cement silo has self-contained bucket elevator system, boot hopper — and air-ram operated 4,000-lb. cement batcher, which can be remote-controlled from aggregate plant. Also in a single unit — aggregate batcher, discharge conveyor, auto-stop water meter with 2-in. piping. Independent overhead aggregate storage bin completes the "Gopher" plant. Everything you need in just 3 simple units — and at a low price that will surprise you! Better phone Johnson distributor, or write us today. You'll be glad you did!

JOHNSON

Mail to: C. S. JOHNSON COMPANY, Champaign, Illinois

Send "Gopher" ☐ spec. sheet ☐ bulletin ☐ Have distributor get in touch.

NAME _____ TITLE _____

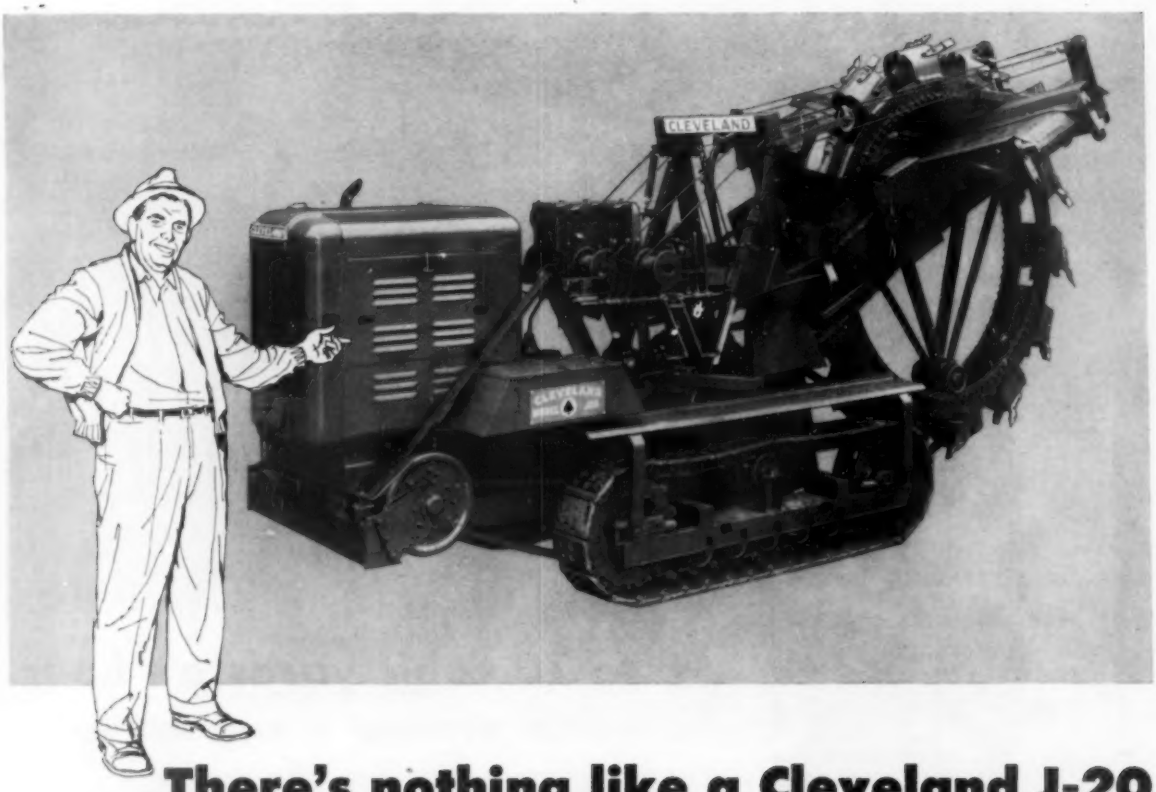
COMPANY _____ DIV. _____

STREET _____

CITY, STATE _____ J-6 BB

"Keep Your Eye on the Gopher" FROM C. S. JOHNSON CO. (Division of Koehring Company) CHAMPAIGN, ILLINOIS STOCKTON, CALIFORNIA

. . . for more details circle 342 on enclosed return postal card



There's nothing like a Cleveland J-20 for distribution trenching

- only 60" wide over its crawlers.
- hydraulically shifted conveyor.
- pulley-enclosed dual conveyor drive.
- operator controls conveyor speed and direction.
- digs 12"—24" wide, 5½' deep.
- 4 forward wheel speeds plus reverse.
- 33 positive digging speeds.
- *all* speeds in both directions.
- world's finest trencher crawlers.
- 1,000-hour track lubrication.
- full-range boom hoist.
- 330 cu. in. engine, 50 HP @ only 1250 RPM.
- hydraulic-lift crumbing shoe, optional.
- 100% control at operator location.

DIGS MORE JOBS...
IN MORE PLACES...
AT LESS COST

- works in tightest quarters.
- sneaks by poles, trees, etc.
- trenches 18" from side clearance.
- digs services as well as main extensions.
- digs all soils—hard, loose, wet, dry.
- truck-loads on shallow, excess-spoil cuts.
- conveyor capacity for deep sloped trench.
- easy on lawns, sidewalks, blacktop.
- digs trench clean, to precise grade and width.
- reliable production in all job conditions.
- simplifies job-scheduling.

Check with your distributor now...get the complete J-20 story

Good Everywhere ®

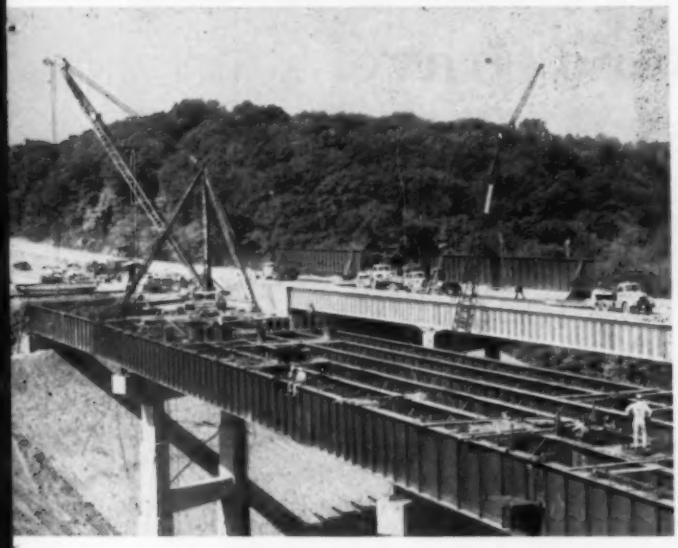
The CLEVELAND TRENCHER Co.

20100 St. Clair Avenue • Cleveland 17, Ohio

. . . for more details circle 303 on enclosed return postal card

At Paine Creek, in eastern Ohio. A girder has arrived, and is waiting pickup and setting by the crane stationed on the ground below. Part of American Bridge Company's subcontract work for Horvitz Co. and other contractors along Ohio Route 1. ➔

The Paine Creek superstructure nearing completion. Delivery of large structural members is increasingly left to specialists.



SPECIAL GIRDER HANDLING

Continued from page 77

cranes, welding machines and other construction equipment.

Cleveland Cartage Co. is one of a group of ten companies, which, together, rate as a national leader among hauling and materials handling enterprises. While its large combined fleet is noteworthy, interest centers in the firm's special industrial and structural hauling service available in the highway program. The company that once took on a 176,000 lb. transformer in stride can handle any bridge job. Under president John C. DeVenne, the firm is one of the many types of specialist contractors who support the prime road contractors.

Vibrating Screed Finishes Pile-Supported Road Slabs

On the new bypass of Highway 1 at St. Augustine, Florida, James H. Cragg Construction Co. had to construct concrete pavement on an old lake bed. Because of soil conditions, the engineers determined on piling to support the road slabs against settlement. Also because of the special conditions, the usual paving train could not be used. Instead, the contractor employed a Stow 34 ft. vibrating screed with an adjustable crown feature in the center and two power paks.

The two to three inch slump concrete was poured and raked to the approximate height of the forms. Then the screed, supported by rollers at each end, was pulled along, striking off the surface true to grade and vibrating the concrete at the same time.

One Out Of Every Seven employed persons in the U.S. works in the highway transport industry - a total of 10.4 million automotive jobs, according to the 39th edition of "Automobile Facts & Figures".

"Buried trestle" pavement supported on piling, seen during the finishing job which was handled much as in finishing a bridge deck.

Ready-Mix and Sand-Gravel Producers Discuss Highway Requirements

By James R. Cummings
Associate Editor

The ready-mix industry viewed itself at the annual convention in Chicago in February and found itself not wanting. This appraisal was enlivened, though, by a few self-administered slaps on the wrist—"Each time a ready-mix concrete producer fails to perform properly, he gives himself and the industry a reputation that is difficult to live with . . ."

This annual combined convention of the National Sand and Gravel Association and the National Ready Mixed Concrete Association was host to a record-breaking attendance of 7,200 from February 15 to 19.

William F. Mengel, vice president of F. F. Mengel Co., Wisconsin Rapids, Wisconsin, shook up whatever complacency might have existed regarding the achievements of ready-mix thus far in highway paving. The Mengel company operates sand and gravel and ready-mix concrete plants in Wisconsin, and, during 1959, added to its string of highway mileage paved by ready-mix in that state.

Mengel said that, excluding concrete used for structural work, ready-mix has supplied most of the concrete for the paving programs in the nation's metropolitan areas and their adjacent districts. But he added that ready mix has met resistance to wide use and acceptance on the large urban and city paving projects, with this resistance coming from paving contractors, highway engineers and from the ready-mix producers themselves.

"It is difficult to turn away extra concrete volume that would seem to offer increased net profits, but the wise operator knows he must maintain excellent service and quality and keep satisfied all the people connected with his business. However the temptation for expanded sales has been too great for some ready-mix operators, even though they don't have the necessary facilities.

"To service the paving job, these operators find that it usually takes almost all their available truck mixers and that their batch plant is required to work near capacity. About the time they start servicing the paving job, a good repeat customer needs some concrete. They can't turn away Joe, their regular bread and butter customer, so they take a truck off the paving job. When a couple more Joes come along there are not enough trucks available to service all the jobs properly.

"Frantic attempts are made to find extra trucks somewhere. Finally the producer locates his best friend, who sends his poorest truck to help the situation. It is without doubt the poorest or last truck in the fleet, or one that has been sitting in the field waiting repair. It breaks down just as it is getting loaded or unloaded.

"Now the operator has enough trucks but he can't get them loaded at the plant fast enough. The plant personnel are given a pep talk to speed the operation, and then the batch man or someone else in a hurry makes a mistake—and service comes to a halt.

"The paving inspector goes wild, the paving contractor jumps on his hat, good friend Joe goes to the competing ready-mix plant and insists he is their friend, and the confused ready-mix supplier wishes he had never attempted the paving contract."

"This sort of foolishness must stop!" continued Mengel. "Before a ready-mix producer decides to service a job that requires an unusually high volume of concrete during relatively short periods, he must study the conditions that must be met. There is no short cut."

The functions of a concrete control engineer were discussed from the point of view of two supplying firms. Herbert C. Cullison, sales manager, concrete and aggregates, for Harry T. Campbell Sons' Corp.,

John B. Donovan of Springfield, Mass., new president of NRMCA, right, is greeted by retiring president F. F. Schouweiler. Ready-mix association officers also include vice presidents Ralph H. Anderson, Columbus, Ohio, and William J. Hichin, Jr., Jacksonville, Fla. Treasurer is Edward J. Nunan, Buffalo, N. Y.

At right, new president of the National Sand and Gravel Association, E. K. Davison of Pittsburgh, Pa., is retiring president E. Phil Gemmer. NSGA's 1960 officers also include Fred P. Curtis, Omaha, Nebr., vice president; Harold E. Bender, Azusa, Calif., secretary-treasurer.

Towson, Maryland, stressed laboratory control and the "public relations" benefits that can ensue. He admitted that a laboratory and its equipment can mount to a sizeable investment but, with the objective of deriving the fullest benefits—". . . what about customer relations? Let's get on the bandwagon with our neighboring industries and show our customers that we, too, spend money for quality control and research."

Cullison said that, even though it may not be large or elaborate, a lab can be located conspicuously on the property and identified with a good sign. He suggested encouraging the customers to look it over, and added that drivers and plant personnel appreciate the opportunity of learning about the lab and its functions.

Quality control of the components of good concrete was stressed by Harry Irwin, materials engineer of Warner Company, Philadelphia. His company uses the Delaware River for transportation of aggregate to its ready-mix and central-mix plants, and Irwin discussed the use of barges in shipment of sand and gravel.

Before loading on the barges, the coarse aggregates are given a final washing through a 'scrubber' and then loaded so that the possibility of segregation is eliminated. The barges for both the fine and coarse aggregates are designed with scuppers so that the freshly washed stone can drain on the trip down the river. Experience has shown, said Irwin, that this trip gives the coarse aggregate a chance to reach equilibrium as far as moisture is concerned. The barges serve as stockpiles, he added, and the gravel is unloaded from barge to overhead batching bin with as little rehandling as possible.

Sand tends to have a more variable moisture content, and to offset this factor it is unloaded in horizontal layers according to Irwin, so there will be no wide fluctuation in moisture content between the top of the boat, with a moisture content of perhaps 2 percent, and the deck sand at over 6 percent.

Regarding cement, Irwin said that mill tests are obtained from the 16 different mills furnishing cement. He also spot checks samples from cars received—"It is my belief that spot checking tends to upgrade the strength characteristics of the cements when the companies know we are comparing their results with others in the area."

The place of automation in the modern production of ready-mix concrete was discussed by Kenneth P. Kerr, vice-president of Butler Bin Company, Waukesha, Wisconsin, and chairman of the Concrete Plant Manufacturers Bureau. After emphasizing the capacity of automated batch plants to speed production and delivery, Kerr mentioned some contributions which automated equipment can make to the quality of the product:

(1) With proper automation, the operator can be certain that the correct materials in the proper amounts went into the truck, and that "carelessness, ignorance, indifference, negligence, stupidity, confusion, laziness, fatigue and other considerations in the 'human element' do not become part of your product, your reputation and your profit and loss."

(2) Properly automated batching equipment will provide exactness in weighing, and with a sustained speed not possible with manual controls. It incorporates other features, among them being proper water compensation, also interlocking to guarantee the correctness of the batch cycle.

(3) Because of its exactness in weighing, automated equipment will afford savings in cement and aggregate and will provide consistent strengths.

(4) It will make fewer demands on the operator;

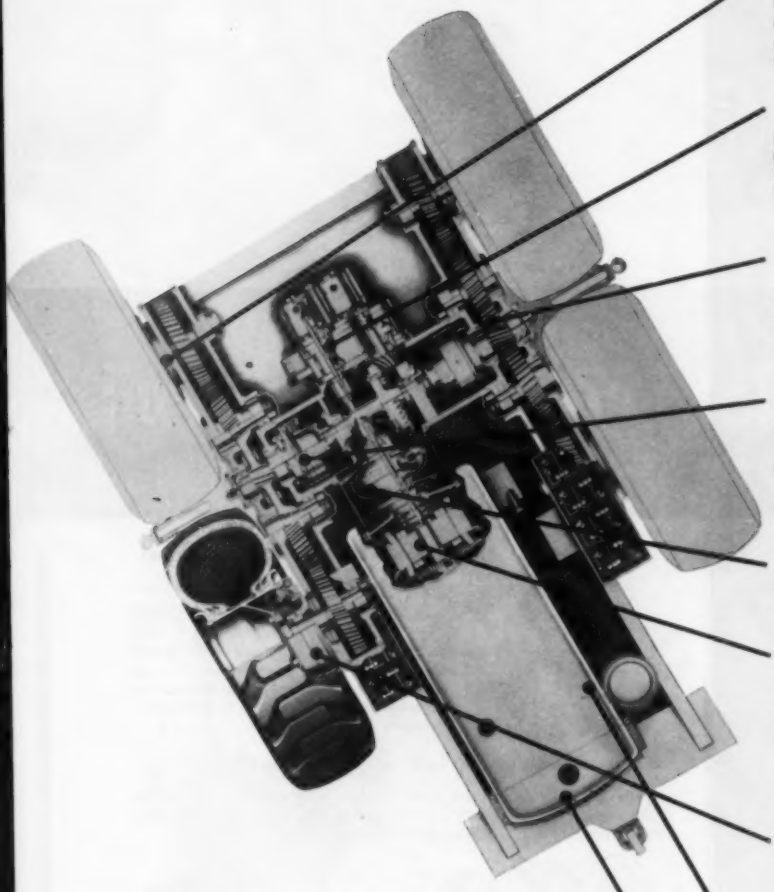
Continued on page 91

Question:

What makes this big tractor work faster ...do more work at less cost?

Answer:

Fast travel...efficient transfer of power through anti-friction power-train



Sturdy axles ride on anti-friction bearings

Heavy axle housings are welded to case for rigid support. Axles ride on roller and ball bearings with smooth, anti-friction ease. Axles are heavy and accurately balanced to take severe shocks and give lasting service.

Constant-mesh transmission

Standard on all Tournatractors. A long-proven, air-operated unit giving reliable performance on thousands of Tournatractors, as well as on LW Tournapulls®, in world-wide service. Transmission is operated by an air-clutch assembly, installed as a single unit.

All gears made of special alloys for anti-friction wear

Materials used in all gears are specially selected for strength, and heat-treated to survive severe shocks and wear. Close fit and smooth operation minimizes heat and power-loss, assures longer life, fewer maintenance problems and costs.

Independent steering clutch

Machine makes complete reverse turn in 6 seconds and a non-stop U-turn within a clearance of 20'. That's because of independent steering clutch, instant gear selection, and large brake surface. Machine maneuvers easily in tight quarters at greater speed and less operator effort.

Single-stage torque converter
4 speed ranges forward, 2 reverse

Exclusive LW design. Built specially for trouble-free operation, proved in thousands of installations all over the world.

Heavy-duty electric generator

Crank-shaft-driven, direct from engine. Electric control in Tournatractor has proved more economical to maintain than hydraulic or cable-control systems. Simplicity of electric control keeps maintenance costs low, makes handling fast, easy. Also provides portable power supply for emergency use of searchlights, welders, drills, other electric equipment.

Heavy-duty air brakes
(3,762 sq in. brake surface)

Operator has sure, safe control at all times with moly-coated brake discs. He has more square inches of braking surface per wheel (940½") than most comparable units have on the whole machine. This gives operator confidence to work close to steep embankments, down steep grades.

Choice of GM or Cummins diesel engine

Permits selection of power desired. GM 6-71 delivers 218 hp at 2000 RPM. Cummins HBIS-600 delivers 210 hp at 1800 RPM. Plenty of power with the engine of your choice, to get the snap and lugging action required for best tractor performance.

Independent cooling for torque-converter oil

Torque-converter oil is circulated through separate heat exchanges located in base of machine radiator. Oil is kept at cool operating temperature for maximum efficiency of torque converter.

CT-2292-DC-2

Compact, sturdy construction... fast maneuverability... easy handling... and quick acceleration, combine to give you a heavy-duty tractor adaptable to wide usage. The entire LeTourneau-Westinghouse Tournatractor® mechanism is protected from abrasive dirt and corrosive moisture. Machine rolls freely... on top of the dirt... on big, self-cleaning tires that give low-cost, high-speed operation. On every tractor job Tournatractor will help you cut costs. We will be glad to demonstrate.

LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

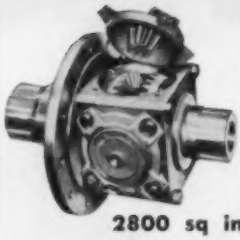
A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

Owner of 40 "D's" says: "As a cleanup tool, the D 'Pull*

Flat blade and bottom for fast finishing

D 'Pull's flat, straight-edged blade and smooth, flat bowl-bottom let you establish grades that are remarkably close and accurate. Some scrapers in this range offer curved or rounded blades and bottoms which make them completely unsuitable for finish-work.



Power-Transfer Differential licks traction problems

When either "D" drive-wheel starts to spin in soft going (or on curves, slopes) its tractive effort is immediately and automatically transferred to other drive wheel. You get "keep-moving" traction in conditions that stop other scrapers. Famous LW differential is simple, maintenance-free.

2800 sq inches of brake surface

That's 2½ to 7 times more brake surface than any other scraper in "D's" class. You get heavy-duty air brakes on each wheel, with alternately-placed lined and moly-coated steel discs.

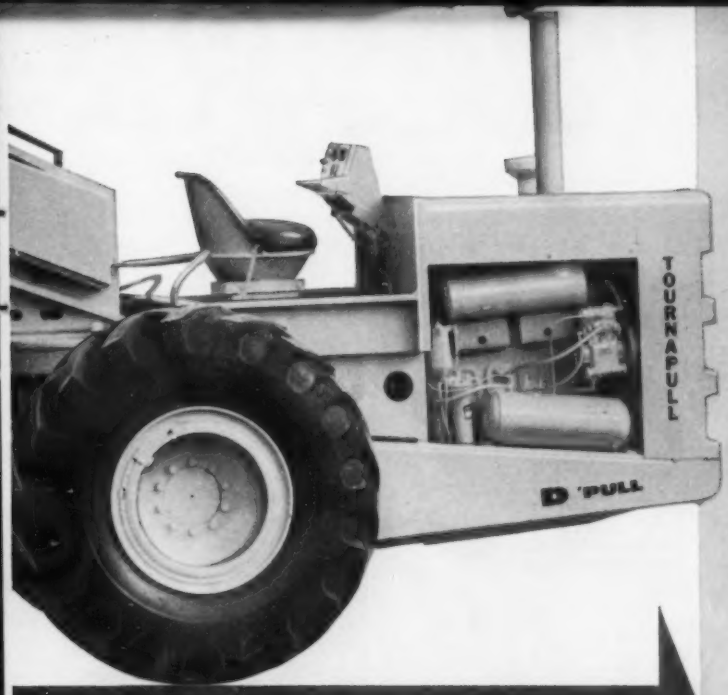
Roadable without permit

Only D 'Pull, in its size class, meets requirements for permit-free roadability. It is only 8' wide, has less than 9 tons of weight on either of its axles. You can route it along city streets without flatbed and loading crew. And on finishing jobs, it can return along concrete highways not yet open to traffic, with no fear of cracking or chipping the new surface.

Best power-weight ratio in its class . . . for more "snap", higher speeds

Each of D 'Pull's 143 "horses" has to power only 299 lb of loaded weight. Here's how this compares in the industry:

Scraper	Lb Weight Unit & Load	Rated hp	Power-Weight Ratio
D 'Pull	42,830	143	299:1
A	52,500	155	339:1
C	58,500	143	409:1
E	47,500	148	321:1
I	81,500	172	474:1
M	54,000	162	333:1



Here's a direct quote from a contractor† who's one of the country's ten largest

"Cleanup work is a 'necessary evil' on construction jobs. Even though it isn't the 'money-making' portion of the job — if it can be accomplished quickly and economically, it's still money in your pocket.

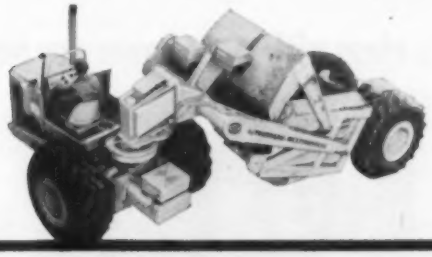
"As a cleanup tool, the LeTourneau-Westinghouse D Tournapull® has no competition in its class. Because of its size, it is economical to operate; it is highly maneuverable; it can be roaded from job to job over highways, or from section to section of jobs easily and fast; and where operating areas are restricted, its short turning radius makes it possible to handle cleanup jobs where other equipment cannot."

†Name on request.

has no competition"

Most maneuverable scraper of all

D 'Pull U-turns in 24'3"-wide area. No other scraper can touch that maneuverability. You benefit on every cycle, because "D" can work closer to edges of new highway slabs, position faster, get into fill more easily, and avoid long, slow back-ups.



Plus all of these Cost-Cutting "Best of Its Class" Advantages

CHOICE OF TRANSMISSIONS... step-gear or power-shift with torque-converter (only scraper in this range to offer you this choice); LOWEST LIST PRICE... HIGHEST TRADE-IN VALUE... ELECTRIC CONTROLS for fast response, easiest operation, lowest maintenance costs, and complete weather-proof availability... INTERCHANGEABLE TRAIL UNITS: remove scraper and use 11-ton Rear-Dump, Flat-Bed, Side-Dump, or Crane behind D 'Pull prime-mover.

Your LW Distributor has copies for you and your equipment supervisors of this new 16-page summary of D Tournapull features. It gives you the background facts of *why* the "D" is a money-maker on any-size job. Better yet, talk to your LW Distributor about a demonstration of the D 'Pull as a finish and cleanup tool, on any job you're now handling. He'll arrange all details at no cost or trouble to you.

*Trademark DP-2298-DC-2

LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

. . . for more details circle 350 on enclosed return postal card **Where quality is a habit**

OLIVER OC-12 tops in its class with more power per pound

...prove it with an on-your-job work test!

The roughest, toughest, dirtiest job you have is a snap for the OC-12! Here's almost 13,000 pounds of drawbar pull in a modern, live-weight crawler that's geared for action.

The OC-12 has heft only where needed. It packs in its high-clearance design the solid dependability that keeps it on the job year after year.

High-speed maneuverability with low-effort operation is yours, too. Oliver's exclusive "Spot-Turn" wet clutch steering lets you brake and turn with only one lever for each track. You move faster, easier, safer in the crawler that users say is the production champ its size.

Work-test an OC-12 on your own road jobs. Your Oliver distributor welcomes your call to demonstrate.

LOOK TO OLIVER FOR YOUR BEST BUY IN WHEEL AND CRAWLER TRACTORS

THE OLIVER CORPORATION

Dept. 2232, 400 West Madison Street, Chicago 6, Illinois

. . . for more details circle 361 on enclosed return postal card

OLIVER OC-126—1½-yd. loader—is the top-speed materials handler. Heavy, rigidly mounted frame provides extra stability to eliminate any rocking. "Spot-Turn" steering means faster loading, more productive cycles per hour. Try it on your job.

Ready-Mix and Aggregate Producers

Continued from page 85

"the equipment, though quite complex, is easy to operate. "We mentioned the human element; with properly automated batching equipment, this is reduced to just about bottom."

When decision-time arrives regarding the purchase of automated batching equipment, Kerr suggested a look at some of the "facts of life" first.

"You are going to spend some money," he began. This is perhaps the easiest decision, he said, for all the benefits mentioned above can be studied, then accepted or rejected as to their value to the producer.

"Can your organization accept this new tool?" Its operation is simple but by nature it is complex: "Can your employees understand its facts and functions so that you can use it without adding another 'ulcer factor' to your already sufficiently complete quota?"

"Should it be an electrical or an electronic system?" The electrical unit has one big advantage: it is something that can be understood by the local electrician. An electronically controlled system, however, will possess some refinements and processes which are better—or only—handled electronically.

Ralph E. Simpson, engineer-director of the Indiana Mineral Aggregates Association, said that this (aggregates) industry supplies the largest volume of material used by the highway departments. "This fact is often obscured because the prices of our indispensable products are so low that the total costs of such items do not loom dramatically on balance sheets. Thus even experienced highway administrators can and do sometimes minimize our contributions. This, then, discloses one of the areas of cooperation: our industry must not be forgotten or overlooked, and neither should it become an offensively obtrusive nuisance."

In talking of the cooperation between aggregate producers and state highway departments, Simpson cited the work of the late Sam Hadden, former chief of the Indiana state highway department. His principal contribution to this bond between the two, according to Simpson, was "his embracing of the concept that a rock is a rock, whether it was reduced to fragments by glacial action thousands of years ago or fractured by machine just yesterday —even if one of those machines should be a blast furnace."

It was announced that the combined annual meeting of the two associations will be held January 23-26, 1961, at Miami Beach, Florida, with the 1962 convention returning to Chicago.

Contractor Earns Bonus

Continued from page 73

worked into the surface by troweling methods, the surface then being given a steel-trowel finish, and lightly brushed for final finish.

The contract was substantially completed September 1, 1959, with an earned bonus of $15,000 for finishing ahead of schedule. The work involved 106,000 sq. yd. of new pavement and base, 37,000 sq. yd. of walks and driveways, plus the sewer work.

Getting this ambitious project done well within the allotted contract time is attributable first to the excellent cooperation of the downtown business men of Abilene. They realized what had to be done and were willing to absorb the inconveniences. And secondly, authority was centered in a few hands. The city manager used his authority to give quick yes or no to any question on a five-minute notice, with the project manager acting similarly for the contractor.

Also each utility company furnished a fully responsible representative, and in this way helped resolve unforeseen problems in called-meetings of the effected representatives in a matter of minutes. This was a "must", considering the unmapped underground lines, necessary change orders, and the ever-present obligation of inconveniencing the downtown businesses as little as possible.

During the entire construction period, not one complaint was made to the City Council or the engineer regarding the operations of the contractor. This fact compliments highly the manner in which the procedures were handled by the city administrative, consulting engineers, Yeatts & Decker, utility company and contractor.

Report on $400,000,000 Emergency F.A. Program

Where do things stand with 1958 $400,000,000 "job making" emergency road program voted by Congress under the 1958 Federal-Aid Highway Act? The full $400 million of Federal-aid available was awarded to contract prior to December 1, 1958, the deadline set in the Act. Total construction completed since initiation of this program covered 11,849 miles and 1,290 bridges, costing $582 million. As of January 31, 1960, construction was still under way on 280 miles and 44 bridges estimated to cost $38 million, according to the Bureau of Public Roads.

MICHIGAN LEADS the Northeastern states in Interstate freeway mileage open to traffic on a non-toll basis—265 miles as of 1959 year-end. Another 100 miles of expressways in Michigan are in service outside the Interstate system.

WHAT ARE YOU PAYING FOR REPAIRS?

The money you are paying to keep worn out equipment working may be just enough for you to own better equipment.

See the

CLEARING HOUSE SECTION

One of the safety conferences planned to indoctrinate Colorado state highway maintenance leaders in safety methods.

Safety Seminars for Maintenance Workers

Maintenance foreman is key man in Colorado campaign to cut worker accidents and insurance costs

An intensive course in safety leadership sponsored by the safety-minded Colorado department of highways appears to be paying off. Seminars held late in 1959 have shown results in accident prevention and in lessened compensation insurance payments.

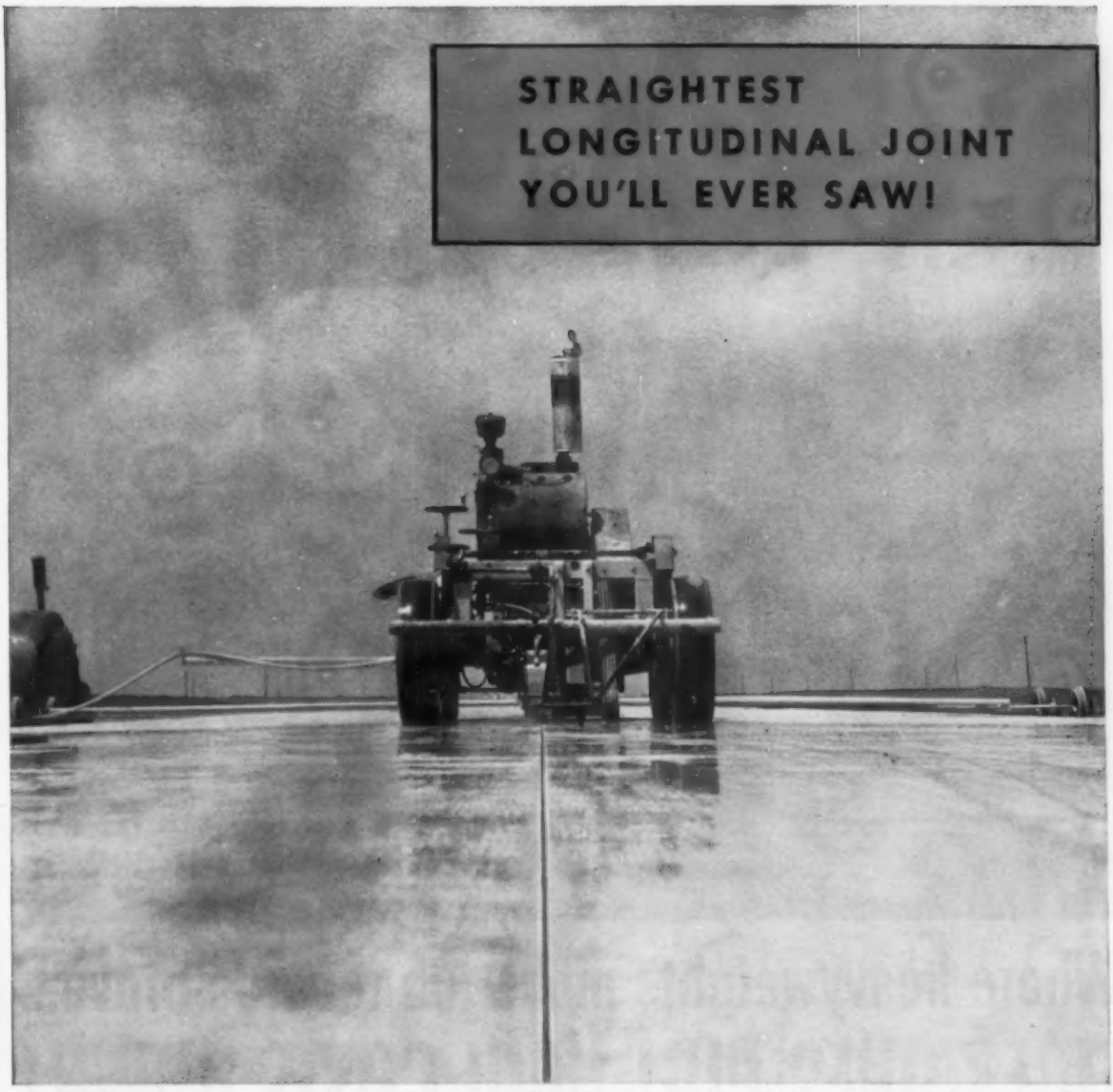
Personnel director J. F. DeVivier said the department "for a time seemed to be headed for a new all-time high in the number of accidents, based on the first six months of 1959. When we conducted a series of safety courses for maintenance supervisors throughout the state. Perhaps it was coincidence, but we feel that as the supervisors and their men gave more serious attention to safety, we gained the reward of fewer injuries."

Before the safety courses were completed, on-the-job accidents were occurring at an average of 19 a month. In November of 1959, they dropped to 14, placing the total for the first 11 months of 1959 at 205, with 155 of them in the accident-prone maintenance work.

A further rollback is expected, DeVivier said.

Largely as an outgrowth of its emphasis on safety, the department expects soon to be placed on the same flexible insurance premium basis as large industrial firms—an arrangement which could result in a 15 to 20 percent reimbursement for the department, depending upon the proportion of accident reduction.

Continued on page 95



U. S. Highway No. 10 near Tappan, North Dakota. Northern Improvement Company, Contractors.

'ROUND THE CURVES – ON THE STRAIGHT-A-WAY . . .

. . . The powerful new Clipper Longitudinal Concrete Saw cuts straight and true at speeds up to 35 feet per minute, without a waver – without an operator!

Clipper manufactures the widest range of gasoline and electric powered concrete saws and diamond reinforced abrasive blades for all concrete and asphalt sawing jobs. Call your Clipper Factory Trained Representative COLLECT Today, for an on-the-job demonstration without obligation.

Sold Direct by Clipper Factory Trained Representatives from Offices and Warehouses Coast to Coast.

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MANUFACTURING CO. KANSAS CITY 8, MO.

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Makers of SuperMatic Masonry Saws and Blades—Diamond Core Bits and Drills

439X

FACTORIES IN ENGLAND—FRANCE—GERMANY—ITALY

Mr. Clipper

. . . for more details circle 302 on enclosed return postal card

Where heavyweights move job records prove...

FIRESTONES PULL HAUL COSTS DOWN!

Take a tip from nationwide construction records—Firestones lower tire costs per job! Here's why: Firestone off-the-highway tire dependability plus Firestone's Giant Tire Service keeps expensive equipment on the job and *working*. Firestones are built with Firestone Rubber-X, the longest-wearing rubber ever used in Firestone tires. Firestone Shock-Fortified nylon cord is a natural for off-highway loads—holds impact damage to the minimum. And your Firestone Tire Expert will help you match tires to the job as well as handle all maintenance problems. Turn downtime into worktime with Firestone tires and service! Call your Firestone Dealer or Store today.

WHEN ORDERING NEW EQUIPMENT ALWAYS SPECIFY FIRESTONE TIRES

TUBELESS OR TUBED

Super Rock Grip Wide Base* Super Rock Grip Deep Tread*

Firestone

BETTER RUBBER FROM START TO FINISH

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*Firestone T.M.

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SAFETY SEMINARS

Continued from page 92

The concentrated 10-hour safety courses given stemmed from the department's convictions that there is no justification for an accident—even in inherently hazardous areas—and that a common-sense approach can curtail accidents.

To get its employees to share those convictions, the department decided to concentrate on approximately 125 supervisory maintenance men.

Training officer Alden C. Skyrud, in charge of the courses explained: "We think, as do the chapter leaders of the Associated General Contractors of America, Inc., that an informed foreman having the knowledge and know-how to impart his knowledge is the key to any accident prevention program."

At area meetings in seven cities over a four-month period, maintenance supervisors and foremen were given the course, "Supervisory Training—a Good Investment," by the Colorado Industrial Commission. The series on saving time, life and money previously had been given successfully at many large Colorado industrial plants and government installations.

Maintenance supervisors and foremen gathered for two-day sessions in seven key cities to learn how to develop habits of seeing, thinking and knowing—habits designed to keep them and their men in the field from getting hurt.

Part of each session was devoted to presentation of the principles of good foremanship and safety by the use of equipment movies, art work, flip charts and blackboard illustrations. The remainder of the instruction period was spent discussing specific problems with class participation and narration of pertinent experiences.

Subjects covered included accident costs—direct and indirect; duties of a foreman—teaching and training; accident causes—sources and control; production and safety plans—safety inspection, safety methods, production training; production accident study—employee accident study, accident reports, and a production and safety program.

Following the sessions, students were asked to evaluate the course by answering:

1. What did you learn in the course that will help you in your job?
2. What do you think should have been done differently? What improvements do you suggest?
3. On the whole, how do you rate the course? (No good, mediocre, all right, very good, excellent?)
4. What was your reaction when you were assigned to take this course? (Mad, reluctant, didn't care, interested, glad?)
5. What is your conclusion since taking the course? (Still mad, waste of time, not impressed, glad, very glad?)

Some supervisors and foremen admitted that they had been reluctant to take the course, but, virtually without exception, they answered "very glad" to question No. 5.

Answers to question No. 1 included:

"That safety is the most important part of any job; you cannot complete any job if you have accidents continually.

"During the course of this safety program, I took time to think, and I thought of many unsafe things we do from day to day that have become commonplace. Corrective measures will be taken."

DeVivier and Skyrud are hopeful that, as a result of the department's continuing safety education program, there will be a drastic drop from the 274-on-the-job injuries, including three fatalities, which occurred in 1958—the last full year for which figures are available.

All of the fatalities were in the maintenance division—one when a snow plow went over an embankment, another when a loader overturned on the operator, the third when a highway truck was struck by an automobile.

Slipping and falling contributed to 61 of the 1958 injuries. The second major cause was foreign objects, such as flying sand, gravel and steel particles, in the eyes: 36 accidents and 32 injuries were attributed to cuts by sharp edges on equipment, rocks, etc.

Other major causes of injury included: Falling or flying objects striking employee (but not in eye), 31 injuries; lifting various objects, 27; hand tools slipped or missed during use, 19; employee was burned by hot road oils, explosions of gases or solvents, etc., 11; employee bumped himself, 7; injured by Highway equipment while driving, 7; injured while driving equipment involved in collision with other vehicles, 6; employee was tossing heavy or awkward objects from one position to another, 5; struck by vehicles, but not in vehicle, 3, and kicked while cranking equipment engines, 2.

The department's study revealed that the eye was most susceptible to injury, with 36 such injuries in 1958. Fingers and thumbs ranked second with 30 injuries and the lower area of the back, third, with 28.

Among types of injuries, torn, wrenched or damaged ligaments headed the list with 43. Eye injuries, 36, were second, and torn, wrenched or damaged ligaments in the back area, 25, were third.

Motorola Offers 2-Way Radio Study Course

Principles of operating and servicing two-way radiotelephone equipment are covered in a home study course offered by the newly-established Motorola Training Institute. The course is announced by Arthur L. Reese, the Institute's vice president. Reese is also vice president and general manager, communications division, Motorola, Inc. The course was compiled and produced in affiliation with Motorola.

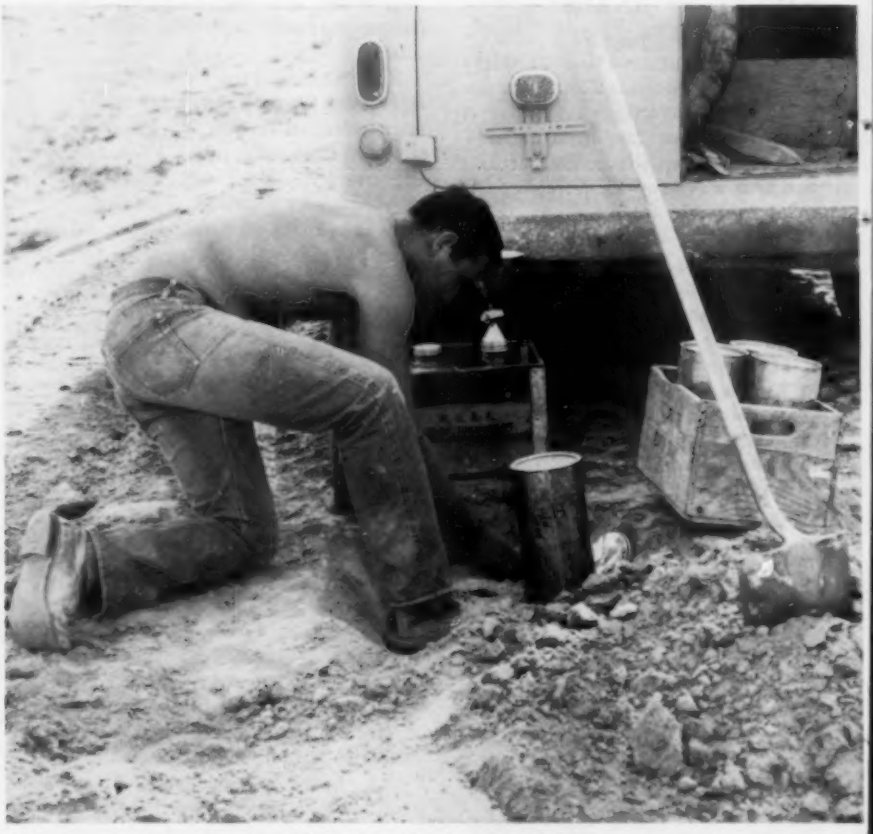
The state-authorized, highly-specialized course is designed for electronic technicians who already have basic knowledge and experience sufficient to pass a Federal Communications Commission technical license examination.

The course's 38 lessons cover such subjects as system analysis, preventive maintenance, test instruments, operation and servicing of transistorized equipment. A complete set of text books and extensive reprinted technical articles are supplied.

Individualized instruction will be given each student enrolling in the course which costs, including texts and reference material, $95.00 on a time payment plan, with discount for prepayment. For enrollment or more information, write Motorola Training Institute, 4501 W. Augusta Blvd., Chicago 51, Illinois.

The New Contractor-Engineer Relationship

One of a Series



Sampling soil from a compacted layer for a density check. What will the state's test show? Can the contractor wait that long to know how well he is getting his densities? Does he want a double-check of his own for any reason? Contractors these days often run such tests, or hire outside laboratory service.

Contractors Doing More Testing on Their Own

By Theodore W. Van Zelst

President, Soiltest, Inc.

To appraise the growing interest in results-type specifications, Soiltest, Inc., conducted a survey among the chief engineers of the U.S. highway departments, federal, state and county.

Here is what we wanted to know:

Is your state issuing end-results specifications contracts?

Is your state in favor of control testing for contractors?

Is your state willing to assist in training technicians?

The replies were revealing.

Eighteen out of the 29 states which replied said they are writing some end-results specifications; 91 percent indicated the feeling that contractors should do some testing for their own protection.

If end-results specification is moving that fast, it means that the whole area of quality control becomes a matter of far greater responsibility to contractors.

Continued on page 99

PRODUCT LEADERSHIP IN ACTION ...CURTISS-WRIGHT EARTHMOVERS

Leadership proven in the field is the ONLY kind that is important to your job profits. We mean leadership based on TODAY'S performance, not leadership based on YESTERDAY'S tradition. In these days of tight bidding, you can not afford selection of a machine based on the performance of obsolete models. It takes comparative evaluation of cycle times, bowl factors — production proven under today's new performance standards. That is where your profits lie — and that is where Curtiss-Wright proves its product leadership.

SOUTH BEND DIVISION
CURTISS-WRIGHT CORPORATION
SOUTH BEND, INDIANA
Distributed in Canada by Canadian Curtiss-Wright Ltd.

TURN PAGE

BOWL FACTORS—
Check Them Before You Buy!

A bowl factor is the ratio between the rated capacity of a scraper and the amount of material it actually carries. For example: a 20 cu. yd. struck capacity scraper averaging 15 pay yds. per load would have a bowl factor of .75 or 75%

$$\left\{ \frac{\text{15 Actual Pay yards}}{\text{20 Struck yardage cap.}} = .75 \right\}$$

To move the most material with the least cost, you need the scraper that has the greatest bowl factor. Looks are deceiving — and the scraper that looks full may not be full at all because of swell — the difference in the density of the material in the scraper versus the material in the bank. In other words, the loaded material will contain voids, due to two major factors 1) the type of material and 2) the lack of bowl efficiency. When the scraper's performance is being evaluated the bank weight of the material must be divided into the weight of the load to obtain the pay yards. These pay yards divided by the rated struck capacity equals the bowl factor. Therefore a scraper must have a high bowl efficiency to provide the greatest bowl factor which is the key to pay yards — your actual measure of production. Check Curtiss-Wright's high bowl efficiencies.

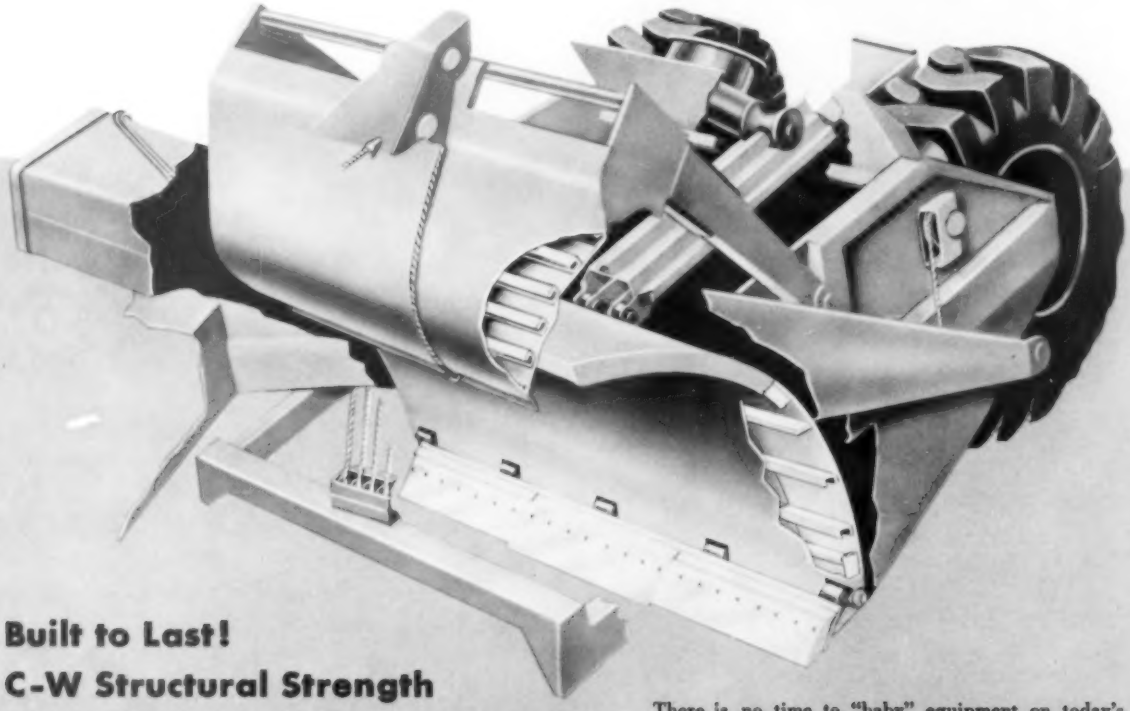
CONSTANT "LIVE" POWER CONTROL UNIT

The main features of the Curtiss-Wright "live" Power Control Unit are:

(1) The "live" power control unit provides complete control of each operation at all times — giving you better control and faster cycles than with other type units.

(2) The method used by Curtiss-Wright to provide a "live" power control unit made it possible to locate it for maximum efficiency. No compromise was necessary, as with other units, which must be positioned near the transmission.

For a real endorsement of the "live" power control unit, ask any C-W scraper operator. His answer will be emphatic . . . The best power control system available—another Curtiss-Wright performance feature.



Built to Last!
C-W Structural Strength
Assures Longer Machine Life

There is no time to "baby" equipment on today's tightly run jobs. Every unit must be built to take a brutal succession of strain, stress, weight and wear. Designing a machine that will hold up under this punishment involves not only metal thickness, but also complex internal structural reinforcement based on an analysis of stresses encountered under the most extreme operating conditions. Your Curtiss-Wright distributor will be glad to show you, point by point, why C-W scrapers stand up to the pounding of a tough job better than any other scraper on the market.

SOUTH BEND DIVISION
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FREE . . . An attractive binder for the complete C-W Job Information series is available from your Curtiss-Wright distributor. Ask for it!

AD NO. 52-73 PRINTED IN U.S.A.

CONTRACTOR TESTING

Continued from page 96

As end-results specifications come into increasing use, it means that contractors will have to do more of their own investigation and on-the-job materials testing. Some may assume this control testing themselves. Others may retain private laboratory or engineering firms. But the point is that contractors often will have to be concerned, more than ever, with testing. With end-results specifications the bee is on the contractor not only to produce, but to produce *with quality.*

The U.S. Bureau of Public Roads, which decidedly favors end-results specifications for compaction work, recently has reviewed state highway department compaction requirements. The federal engineers believe that equipment is becoming obsolete fast; that highway designers who insist on telling the contractors just what machines he must use may be depriving the state of better work at lower prices.

Both the American Association of State Highway Officials and the Associated General Contractors of America have recommended the adoption of the end-result specifications where feasible by all state highway departments. They recommend that to insure full implementation of such specifications, due regarad should be given to the deletion of such phrases as "or as directed by the engineer." AASHO states, "these specifications permit the use of new and improved methods which can be varied according to field conditions encountered. Savings can result from the reasonable and practical approach permitted under end-results specifications."

Actually, many contractors have already developed their own basic testing facilities. Some own their own drill rigs which they utilize in site surveys prior to bidding or to search for sand and gravel deposits.

Others rely upon specialists and consultants as well as commercial laboratories on regular retainers to check all of the work they are doing. Many contractors (even those who use outside services) have their own engineers, and other operating personnel capable of per-

100 ton capacity portable concrete testing machine being used to test concrete cylinders in the field.

In-place field density tests being performed using Volumeasure. A mobile testing laboratory, completely equipped for soils, concrete and asphalt testing is carried on in this trailer.

The miniature compaction apparatus used in the laboratory makes it possible to save a considerable amount of testing sampling time in correlation of field and laboratory compaction test results.

forming some of the basic tests in soil, concrete and asphalt. These help to keep them in line specification-wise as the job progresses.

To get the viewpoint of contractors on end-results developments, Soiltest conducted another survey, directed at reaching large, medium and small contractors engaged in public works construction.

We asked if the contractor had performed a job against end-results specifications, what type of job was involved, and if he felt he had produced as good a job as under "materials-and-methods" specifications. Further questions probed for details on how the contractor checked his work during the job itself.

The contractors responded that most of their testing is in the fields of soils and concrete.

The test performed by more contractors than any other is the concrete slump test, followed by the moisture test in compaction of soils, and then the sieve analysis or gradation test on soils, sand and gravel.

The test for which contractors most frequently turn to laboratories is the compressive strength test of concrete. That is followed by soil density and compaction testing.

Approximately 50 percent of the contractors indicated they are using private testing laboratories and engineers or technicians on their own staff to run field control tests.

The contractors responding to the survey noted that they perform, or retain laboratories for, very little asphalt testing work.

Typical of replies to our survey received from contractors is the statement of an eastern roadbuilder: "In general, we are in favor of the principle of end-results specifications. There have been a number of instances where we feel certain the desired result could have been satisfactorily obtained with a considerable saving in cost, if we had been allowed to follow procedures somewhat in variance with those specified."

Sixty-two percent of the states we queried indicated a willingness to assist contractors in preparing technicians for doing limited amounts of testing.

Some of the state highway departments have already been asked by contractor associations to organize schools for the training of technicians and engineers in basic testing of soils, concrete and asphalt. These schools have drawn up to several hundred attendees. Classes have run for a week or longer, and have included actual testing demonstrations and laboratory periods, as well as lectures on quality control testing.

All of these things point to an increasing interest in quality control among contractors and a willingness among state engineers to pass along their experience in this field. The acceleration of the end-results specification movement may create new problems for both contractors and highway inspectors. Fortunately the techniques of on-the-job testing are not one of them. These are well-established, and there is a variety of equipment available which the contractor's engineer can learn to use as has the highway department inspector.

SHOESTRING CONSTRUCTION CO.
General Delivery
Possom Hollow, Virginia

Highway Engineer
Richmond, Virgina

Re: That Road Job

Dear Sir:

This letter is to let you know we ain't figgering on payning none of that liquitating damages on the job rite after this letter re at the top of the page.

I figgered somethin like that would happen when we didn't get the thing done in the 1st place, when it was supposed to, so I went there myself to see why not and i damed sure did no it ain't our falt.

In the 1st place them plans you give us werent to good and you must have knowed it all the time because somebody in your office had to rite a whole dam book to try to tell what should have been put in the plans in the 1st place and this guy that rote the book weren't any better than the guy that rote the plans. In the 1st place this book was chuck full of stuff about a lot of junk probably some relative of his was sellin, there wasnt anything in the book about the stuff, looked like some loyer had stuck it in there cause it was in real little print and looked like it was there to jip us.

Besides all that the man we sent up there to take care of our stuff and see that the road got bilt said the man you sent up there slowed him down a lot and made him pore truckload after truckload of cement in big holes under the bridges that didn't help none and cost a hell of a lot more money than we aimed to spend.

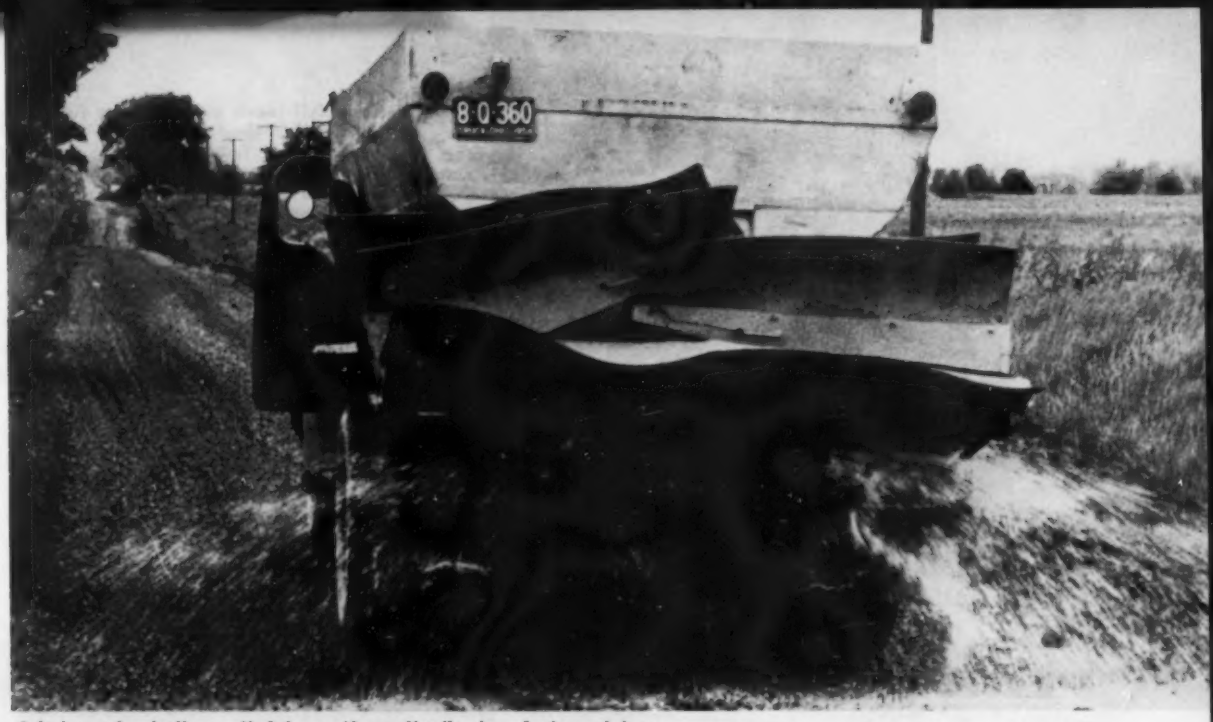
All this stuf caused so much trouble that our man started to drinkin and carryin on some and wen I got there to see about it it aggrevated me so bad I had to go on a months drunk myself and you ought to be smart enuf to know you cant get a road bilt when you got to be drunk all the time.

If you guys had any sinse at all you would have told us wat kind of road you wanted and how wide and where to put and we would have got it bilt in about a month or so and then this woulden have happened and we could all a made a wad of dough.

If this aint enuf to get the damages stoped let us know and we could start tellin some nasty stuff about mistakes in the plans which aint in accord with your ethicks and we don't intend to let that stop us if it looks like it will cost us any money.

By, the Contractor, hisself
I em

(From a Bulletin of Virginia Road Builders Association)



Salt is mechanically applied for uniform distribution during mixing

Ohio Salt-Stabilizes 130 Miles

Salt is on the table again in the Ohio department of highways. In a program to upgrade its last remaining mileage of trafficbound and trafficbound surface treated secondary roads, the state has salt-stabilized 130 miles. The new projects raise Ohio's salt-treated roads on the state system to 681 miles built in the past five years.

Thirteen projects, ranging in length from 4.95 to 18.11 miles, were included in the 1959 construction. They were built under contracts totaling $786,820.

Adoption of salt as a stabilizing agent is the outgrowth of experimental work undertaken in 1955 by the state's highway maintenance division to solve the problem of costly upkeep of the state's secondary mileage.

Annual maintenance costs of the secondary mileage had averaged $1,000 a mile during the ten years prior to the state's decision to undertake the experimental work. The roads had been built up gradually over the years by the occasional addition of aggregate, application of dust control materials and routine surface and ditch maintenance. Some of the low-volume mileage had been treated, but overall winter and spring failures caused mounting maintenance costs.

The aim was to develop a low-cost construction method that would strengthen the bases and remedy deficiencies. The key was to incorporate additional aggregate in the base, rather than continue to pile it on the surface, and to add a stabilizing agent.

Based on some earlier tests, salt was used in 17955 in 25 miles of surfaces. The work was done by state forces under J. W. Reppel, engineer of maintenance. Reporting to the 36th annual meeting of the Highway Research Board in Washington, Reppel said that the "results conclusively indicated the desirability of utilizing this type of construction to improve existing unsatisfactory surfaces."

Then followed annual programs of 260 miles, 167 miles, 99 miles and now 130 miles this year.

Specifications have remained unchanged during the five-year program. Salt is added to the aggregate at the rate of 0.5 per sq. yd. per inch depth of base processed (base depth 4 in. minimum compacted). This averages 15 tons of salt per mile on an 18-ft. road. In the original contract work, priming was specified, but bituminous seals were sold as separate contracts. More recently the sealing is included in the one contract.

Construction methods followed in building the salt-stabilized projects included the following steps:

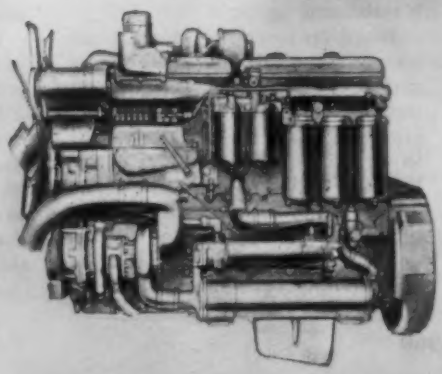
Scarifying. The road is scarified to a depth sufficient to eliminate all surface irregularities (minimum 4 in. usually). Scarifying is not done in advance of the final rolling more than the length of the section which the contractor can mix and roll in

Continued on page 105

Keep full loads on the move full time with exclusive Planet Power-steering. Full power on both tracks, *full time*, is the answer! And Hi-Lo on-the-go power-shifting lets you match power to condition, instantly, and keep the yard-boosting advantage of uninterrupted momentum.

You speed-up all four steps of the push-loading cycle with TD-25 torque-converter and planetary system teamwork! 1) You slow down by power-shifting down and using decelerator to get feather-touch contact; 2) power-shift either track up or down to maintain solid pusher contact on curves; 3) get gear-higher kick-outs, with on-the-go power-shifting; 4) reposition faster, with higher-than-ordinary reverse! Two "25s" tandem-pushing the International 295 Payscraper®, and the third, scarifying, belong to contractor Ed Bentley, Sylacauga, Alabama — building superhighway near Birmingham.

PLANET Power-steering... HI-LO power-shifting... COME AS standard equipment ONLY in the new TD-25



The International DT-817 engine—single power source used in both *pushers* and *scrapers*—an *industry first* in power standardization. You'll find this big new direct-start, 6-cylinder turbocharged diesel powering the full line of International two and three-axle Payscrapers; Paywagons®; and end-dump Payhaulers.® *Plus* the new TD-25! Dual valving of this high-torque, 230-hp power plant provides for peak turbocharging efficiency, to develop full power from sea level to timberline!

As standard equipment at no extra cost, the new 230-hp TD-25 gives you the International®-proven control combination that has been beating king-sized clutch-steered crawlers in yardage for years!

You get combined Planet Power-steering and Hi-Lo on-the-go, power-shifting exclusively in the new International TD-25. And you get this basic, built-in design advantage in your choice of torque-converter or synchromesh model!

With this and all its other big advantages, the TD-25 can outearn other big rigs up to 50%—on push-loading; and pulling big drawbar tools such as shale-shattering scarifers!

No "dead-track drag" or "gear-shift lag"! Planet Power-steering gives you full-time "live" power and traction on both tracks, to make full-load turns—and to eliminate load-limiting "dead-track drag." And Hi-Lo on-the-go power-shifting instantly matches power to conditions to prevent load-losing "gear-shift lag."

Hi-Lo power-shifting makes the TD-25 the industry's only 4-speed torque-converter crawler and the only one with load-matching efficiency-range control. In the synchromesh transmission "25," the Hi-Lo planetary system gives eight speeds forward and reverse—with cycle-speeding, up-or-down, on-the-go power-shifting with "finger-tip" ease!

Power-shift and power-steer the new "25" with full king-size loads—around curves, upgrade, anywhere. Prove what it means to command full-time, full-load ability to outearn clutch-steered king-sized crawlers, up to 50%. Measure all the "25's" standard equipment extra value features! See your International Construction Equipment Distributor for a demonstration!

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A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors... Self-Propelled Scrapers and Bottom-Dump Wagons... Crawler and Rubber-Tired Loaders... Off-Highway Haulers... Diesel and Carbureted Engines... Motor Trucks... Farm Tractors and Equipment.

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The 125 HiLoader's feeder "floats," or rises and falls, with the contour of the material—loads any material uniformly. Plenty of weight and traction in the loader provide the crowding ability, full-floating feeder keeps the flow uniform—5-10 cu. yds. per minute!

ALL THE STORY

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125 HiLOADER

Athey PRODUCTS CORPORATION, 5631 W. 65th ST., CHICAGO 38, ILLINOIS

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OHIO SALT-STABILIZES

Continued from page 101

a day's operation. This length is determined by the Engineer from the Contractor's equipment and operations.

Preparation and Placing of Materials. Scarified material is thoroughly broken down and reduced to a uniform condition, with a power-driven rotary pulverizer or other approved methods that will secure equivalent results. When material thus loosened is found not to meet requirements, additional material is added and blended in. Sodium chloride is then applied at the 0.5 lb. rate per inch.

Mixing. The chemical and additional aggregate are mixed in place by a mechanical mixer, such as an approved power-driven rotary type mixing machine or a travel plant capable of uniformly mixing all materials; or a patrol grader making 3 or more turn-over passes. Blading is sometimes required if a rotary mixer leaves segregation.

Sprinkling and Compacting. Proper moisture content is considered essential for maximum compaction. When the Engineer thinks the mixture is too dry, it is spread out, sprinkled and remixed until uniform. Material that is too wet—again in the Engineer's opinion—is spread on the roadbed, alternatively windrowed and spread, until sufficiently dry to proceed.

The mixed material is then windrowed to both sides of the road, if possible.

The subgrade is required to be thoroughly wet; sprinkled when deemed advisable. The mixed material then is spread in uniform layers not to exceed 3 in. loose measurement. Each layer is shaped and compacted with a tamping or a pneumatic-tired roller. A permissible alternate is to compact the entire thickness in one course by approved vibratory methods.

Final rolling is done with an Ohio Type 3-E or 3-F roller weighing not less than 10 tons.

Irregularities or depressions that develop in any layer under rolling are corrected by loosening the surface, adding material and recompacting. The stability of the final mixture "shall be such that no shoving or deflection is observed during final rolling." The road is left with a crown of ¼ in.

Radio-driven sedan moving at 61 mph strikes California's new cable-chain link design median barrier at 31 degree angle. Vehicle damage: $600. Robot "driver" injuries: minor bruises and possible neck injuries. Effect on barrier: 8' 6" deflection; 80 ft. of fence knocked out; 11 posts damaged beyond repair; no damage to cables.

Chain Link Median Barrier Gets Test OK

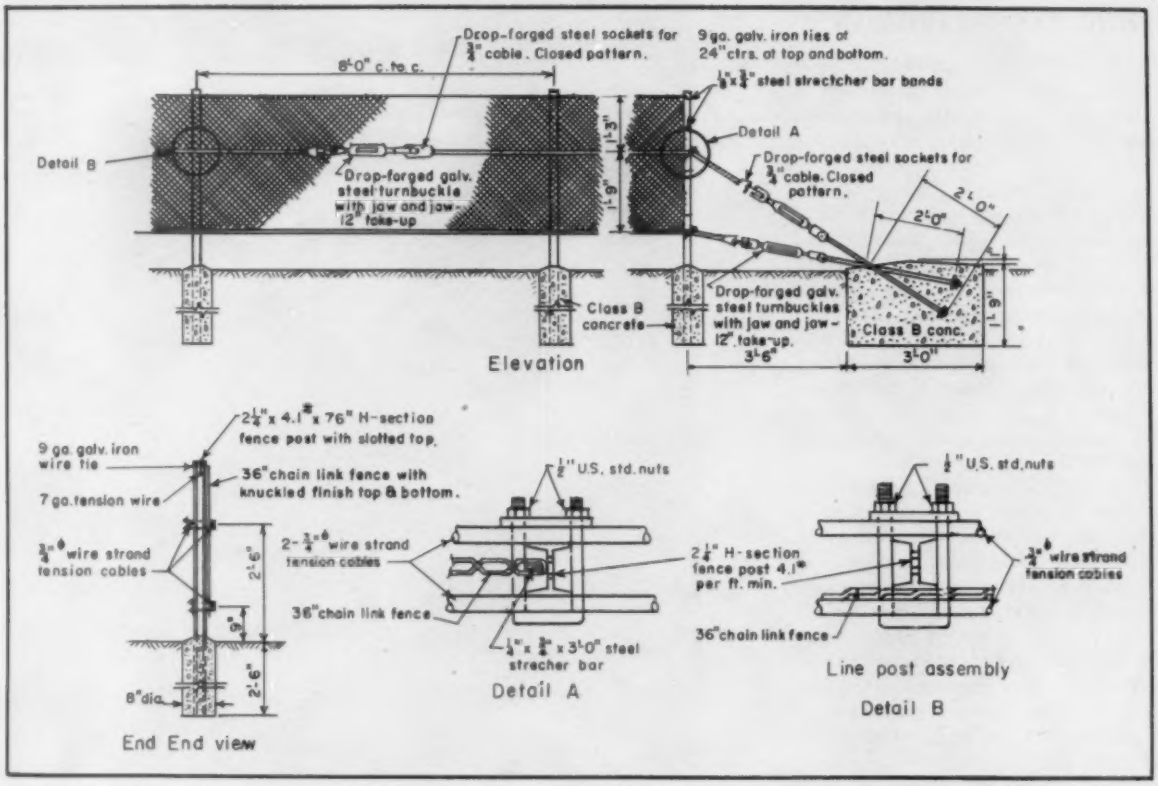
Many common barrier designs for medians may *contribute* to accidents and injuries on modern divided highways.

This is one conclusion from dynamic full-scale tests recently carried out by California's highway division on 15 different types of median barriers.

These exhaustive tests, backed up by accident research on 8,000 divided highway accidents, have led to three new barrier designs—and have brought the decision to begin the immediate installation of the new barriers on sections of several freeways in northern and southern California.

In pursuing the test program, structural and materials engineers at the Division's research laboratory in Sacramento sought designs that would satisfy three criteria of a successful freeway barrier: It must (1) prevent vehicles from crossing the median, (2) minimize the reflection of the vehicle back into its traffic stream, and (3) minimize injuries to the vehicle's occupants.

Standard 4-door cars carrying a dummy driver and sensitive shock recording instruments were used in the tests. The cars were driven by remote control into the various barriers, at speeds up to 60 mph. These dynamic tests were docu-


Drop-forged steel sockets for ¾" cable. Closed pattern.
9 ga. galv. iron ties at 24" ctrs. at top and bottom.
8'-0" c. to c.
1½" x ¾" steel stretcher bar bands
Detail A
Detail B
Drop-forged galv. steel turnbuckle with jaw and jaw - 12" take-up
Drop-forged steel sockets for ¾" cable. Closed pattern.
2'-0"
2'-0"
Class B concrete
Drop-forged galv. steel turnbuckles with jaw and jaw - 12" take-up.
Class B conc.
3'-6"
3'-0"
Elevation
2¼" x 4.1# x 76" H-section fence post with slotted top.
9 ga. galv. iron wire tie
36" chain link fence with knuckled finish top & bottom.
7 ga. tension wire
¾" ϕ wire strand tension cables
2'-6"
6"
2'-6"
8" dia.
End End view
½" U.S. std. nuts
2 - ¾" ϕ wire strand tension cables
36" chain link fence
¼" x 2½" x 3'-0" steel strecher bar
Detail A
½" U.S. std. nuts
2¼" H-section fence post 4.1# per ft. min.
¾" ϕ wire strand tension cables
36" chain link fence
Line post assembly
Detail B

Details of design of the chain-link-fence barrier used in the California test.

mented by seven high-speed cameras. Study of the resulting photographs and deceleration readings from the dummy provided information to members of the Traffic, Design, Bridge, and Materials and Research Departments. These representatives made up a median barrier committee, which has since accepted three different median barriers.

Tests showed that only one barrier satisfied all three design criteria. This was a combination cable and chain-link fence using standard 2¼ in. H-section fence posts supporting 4-ft. chain-link fencing and ¾-in. tension cables. The other two designs—one a blocked-out metal beam barrier, the other a concrete wall barrier—are now to be used where median strips are too small or too narrow for the flexible chain-link barrier.

The effect of the cable-chain-link barrier is to trap the vehicle on the median strip by permitting one front wheel to jump the lower of the tension cables. The cable, pulled taut between the front wheels, keeps the car from crossing the on-coming opposite lanes and from re-entering its own traffic stream.

The upper tension cables are the most important structural elements; both their height and their attachment to the posts are critical. It was found that running the upper cables 30 in. above ground made them high enough to keep most cars from rolling.

Fittings used to secure the tension cables to the posts are designed to hold the cable firmly in place, yet under collision loading to slip from the ends of the posts. Thus the posts become a series of friction brakes permitting the car to be stopped gradually, rather than tripped up as happened in tests involving rigidly secured cables.

The use of this cable-chain link barrier presupposes a deflection of at least 8 ft. when a collision occurs. For median barriers too narrow to permit this deflection, a metal beam barrier and a reinforced concrete wall barrier, both 31 in. high, were designed and tested. Though neither provide the "trapping" characteristics of the cable-chain link barrier, both kept the colliding car from crossing the median, or from being deflected into its former traffic pattern at so sharp an angle as to preclude evasive action by following cars.

Prestressed Concrete Annual Meeting

The 6th annual convention of the Prestressed Concrete Institute, with the theme: "Prestressed Concrete, Key to Creative Architecture and Imaginative Engineering," is set for September 27-30 at Statler-Hilton Hotel in New York City. Expanded space is available for supply exhibitors.

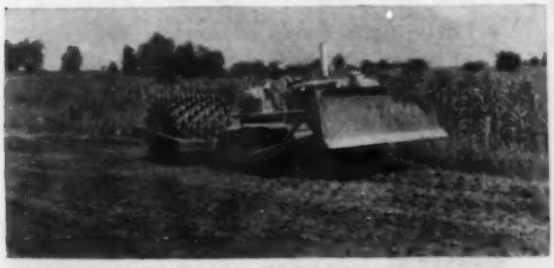
Registration fee for the convention is $35 plus $6.50 for scheduled luncheons. For details write Norman Scott, executive secretary, Prestressed Concrete Institute, 205 West Wacker Drive, Chicago, Illinois.

SCRAPER-LOADING using a Caterpillar No. 60 Scraper is a job the new D7 handles with ease. New Turbocharged Cat Diesel delivers 140 HP. Greater torque rise increases its lugging ability 80 per cent.

TRIPLE PLAY BY NEW D7

Three different tasks and 20 per cent more production

DOZING approaches to Eleven Point Bridge, the D7 aerates heavy, wet earth before compacting and adding more fill. New dry-type air cleaner, lifetime lubricated rollers and new transmission lubricating system make low-cost operation normal for a Cat-built Tractor.



COMPACTING is a job the D7 Series D takes in stride. Final drive gears have been strengthened on the new model and big job-proved features have been retained . . . such as the exclusive oil clutch which delivers as many as 2000 service hours without adjustment.

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All-around performance—dozing, scraping, compacting—makes the D7 Series D an even better investment than the efficient machine it replaced. On this bridge construction job over the Eleven Point River at Dalton, Ark., the approaches had to be cleared and the road widened. Through heavy, wet sand and clay, the new D7 more than lived up to the expectations of Superintendent Farris Whited, Jr., of the E. E. Barber Construction Company, Fort Smith, Ark.: "The new D7 Series D is the best tractor I have ever operated. It can do at least 20 per cent more work than the former model. It loads the scraper fast and hauls and pulls good. In dozing it can really move the dirt, too!"

Ask your Caterpillar Dealer—who sells, services and maintains a complete parts inventory for a full line of equipment—to demonstrate a new D7. You supply the job and name the date. He'll supply the machine and proof of performance. Call him today.

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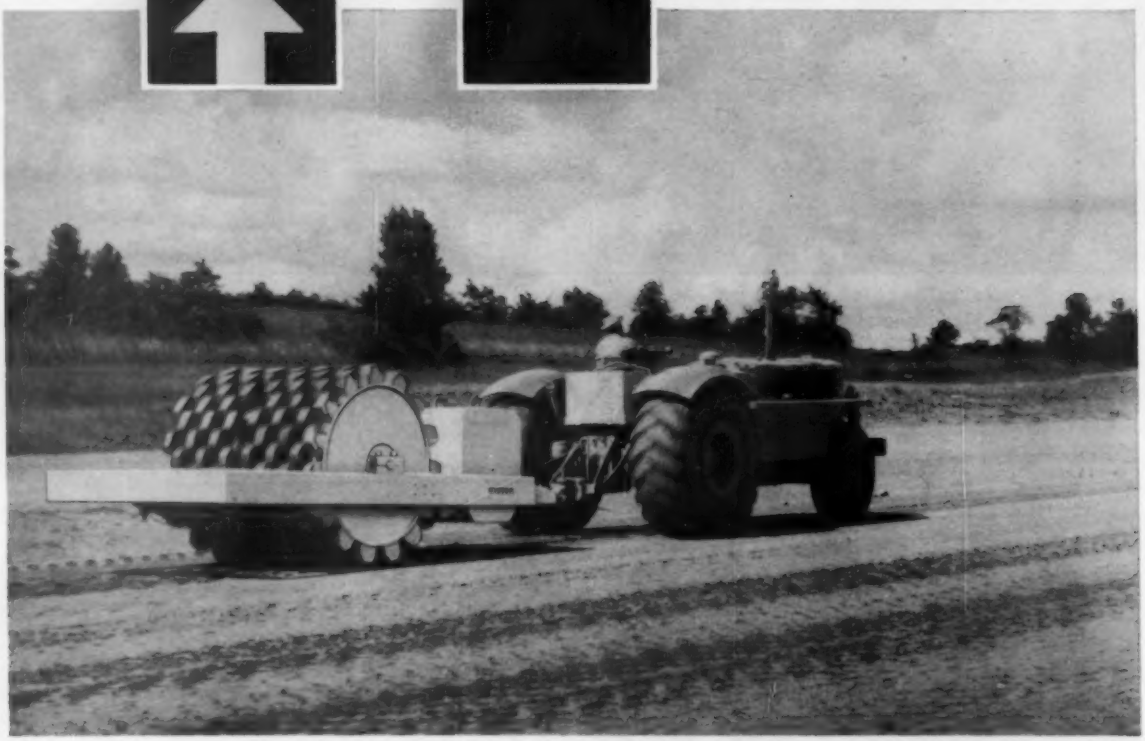

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- High speed rolling cuts compaction costs to less than three cents per cubic yard.
- Large contact area of tamping feet—21 sq. in.—gives fast "walk out"!

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You can depend on Gardner-Denver rotary portable compressors to deliver the air you need in any weather—any climate, any altitude. They are ruggedly built, run smoothly, cost little to maintain. Six capacities from 85 to 900 cfm. Write for Bulletin RC-1. See your Gardner-Denver distributor soon.

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Road-on-a-Raft Crosses Swamp

How contractor used sand and lime-stabilized clay to blanket over organic soil and muck.

By W. C. Vincent

District Laboratory Engineer,
Louisiana Department of Highways, Lafayette

A novel method of building a highway across marshland has recently been carried out by the Louisiana department of highways. The method utilized a berm-type design, in which the road was literally "floated" across a 7,000-ft. section of swamp. The "raft", approximately 200 ft. wide, incorporated a foot depth of sand, a foot of lime-stabilized clay, and another foot of soil, on top of which was placed the roadway proper. (See typical section.)

The project extending 5.5 miles from Florence to Weeks Island is located on new alignment in low-lying sugar cane land along the Gulf Coast. All but the swamp section traverses fairly dry land. Subgrade borings in the swamp section indicated muck and organic material 8 to 10 ft. depth, with the water level affected by tides in the adjacent bay. The concensus of opinion was that a borrow canal design involving complete removal of the muck would be uneconomical.

The berm-type design was based on the following factors:

Spreading hydrated lime for the first 6-in. lime-stabilized course.

1. The load carrying capacity of the muck was assumed to be 432 lb. per sq. ft.

2. The overall thickness of the roadbed, including fill, base material, and surfacing was to be approximately 6 ft.; this represented a dead load of 690 lb. per sq. ft. (the live load would be insignificant).

3. Based on the excess load of 258 lb., the embankment would settle, with the muck being "squeezed" out along the edges of the embankment.

4. To overcome this lateral displacement, a berm was recommended. Since the new highway would parallel the old road on the west side, the berm on one side was necessarily narrow, being built to the old road. It was recommended that the east berm be built 100 ft. from the toe of the fore slope, making the entire new subgrade about 200 ft. wide.

5. To retain the muck and prevent displacement, the berm had to exert a downward pressure equal to or greater than the 258 lb. differential mentioned earlier. Using a safety factor of 25%, the author calculated the berm to be 3 ft. thick; i.e., an additional foot of soil would have to be placed on the 24 in. thick sand and stabilized clay sublayers.

Stabilization of a one foot clay layer across the "raft" with hydrated lime was recommended for the following reasons:

1. In comparing the total load of the embankment and the load of the berm with the support value of the muck, the values obtained afforded a very little safety factor, especially since the support value of the muck was assumed. Thus, the lime stabilized subgrade was recommended in order to obtain a degree of rigidity and thereby disperse the load of the embankment over a large area, reducing the unit stress on the muck.

2. It is the opinion of the writer that the stabilization, due to its relative rigidity, will permit more uniform settlement or consolidation along the roadway. Since consolidation is inherent with this type of design, we have endeavored to maintain minimum and uniform settlement.

3. The lime stabilized subgrade will prevent, to a large degree, the capillary rise of moisture into the embankment.

4. Stabilization would provide a good working table, which would reduce completely the possibility of equipment breaking through and also facilitate proper compaction of the embankment. This proved to be the case, since once the first 6-in. layer of soil lime was completed, the contractor experienced none but normal construction problems in completing the remainder of the embankment. (In fact, he frequently used the stabilized area as a runway for his Cessna 175 airplane).

Construction Procedures. Prior to placing the first layer of sand, the contractor was required to excavate one foot of muck, in order to remove stumps and live vegetation. The excavation was accomplished by using an Insley dragline with a Hendrix ¾ cu. yd. bucket; the dragline was placed on mats and the muck cast along the east right of way line. The contractor installed a Fairbanks-Morse 12-in. electrically-driven tur-

New roadway area after removal of one foot of muck (August, 1957).

Showing a Cat DW15 scraper unloading sand for lower blanket layer. Dozer will spread sand laterally toward left.

Completed embankment and berm. Sand shell base course being completed (April, 1959).

bine pump at the south end of the 200 x 7,000 ft. section, which lowered the water level considerably. This tended to stabilize the muck to some degree. The discharge from the pump emptied into a 4,600-ft. canal, dug by the contractor, which connected with the Intracoastal Waterway. The sequence of operations was to lower the water level with the pump, clear the right of way, and remove one foot of muck.

The contractor elected to use sand available near the job, in lieu of soil, to replace the one foot of muck. This decision undoubtedly made construction of the lower part of the base less difficult. The sand was hauled by scrapers from a pit about a mile from the beginning of the job. The contractor was allowed to construct a haul road along the east edge of the old road by dumping sand until the scrapers could travel without bogging down. The sand was dumped on the haul road and then spread across the width of the roadway with dozers. Extreme care was exercised so as to prevent excess subsidence. However, some subsidence did occur. The relatively small roll of muck moving ahead of the sand was removed by a dragline placed on the levee of muck along the east side. This operation was completed with the equipment breaking through the sand relatively few times. No effort whatsoever was made to compact the sand.

After the sand was placed, the lime stabilized clay layer was built in two 6-in. lifts, using similar construction procedures in each lift. Clay for stabilization was hauled by 13 cu. yd. bottom-dump wagons. During unloading, the least bit of wheel spin caused the wheels to break through. To solve this problem the contractor had the wagons back into the unloading area and utilized a bulldozer to "push unload" them.

Hydrated lime conforming to L.D.H. specifications was then spread on top the first 6-in. course at the rate of 12 percent by volume (about 4 percent weight of dry soil). At first bagged lime was used, but spreading proved to be somewhat slow and expensive. The contractor then switched to bulk lime, using 7-yd. dump trucks and a belt-conveyor type spreader to distribute

Continued on page 117

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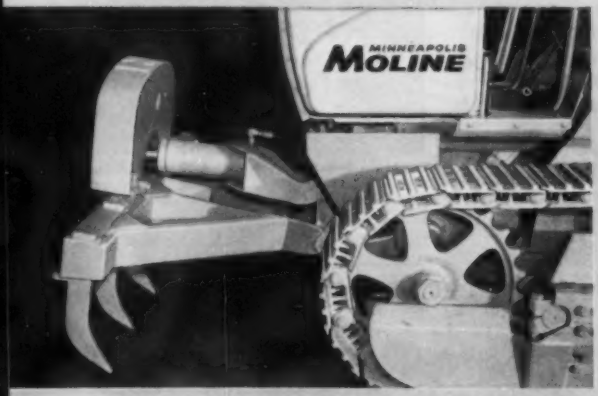
DOZER—The tougher, huskier MOTRAC combines crawler traction, Hydro-Shuttle torque converter drive and Moline-built engine power for bulldozing, stumping and clearing.



SCARIFIER—This powerful hydraulic scarifier rips into asphalt or hardpan surfaces . . . teams with the MOTRAC shovel for fast grading and excavation.

Name the work assignments your new crawler must handle. Then see how the MOTRAC tackles them—see how this powerful, easier-handling crawler boosts output on every job!

On loading, MOTRAC's torque converter drive with toe-operated Hydro-Shuttle takes you from full-ahead crowding to full reverse at the touch of a pedal . . . smoothly, hydraulically, without shifting. You get faster cycles—more yardage per hour.

On excavating, you work with a 1¼ yard bucket, 9000 lbs. of break out force, 59 engine horsepower (gasoline) and 2086 sq. in. of ground-gripping track surface. You get full buckets, pass after pass—new work capacity.

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Lima A-W Portable Crushers deliver

RELIABLE HIGH OUTPUT!

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ROAD-ON-A-RAFT

Continued from page 112

the lime uniformly. Because the clay was generally in a wet condition (about 30 percent moisture), it was necessary to pull the lime trucks through with a dozer or motor grader. The contractor then used the area stabilized for his trucks.

Mixing of lime and clay was accomplished with a Seaman-Andwall pull-type Pulvimixer pulled by a Caterpillar D6 tractor. A lighter track-type tractor was used at first, but heavy wet clay caused the stabilizer to bog down frequently.

Mixing was done in two stages in order to insure maximum breakdown of the clay clods, i.e., after lime spreading the Pulvimixer made about four passes, then the subgrade was allowed to cure for 3 to 5 days, after which the soil was remixed. During this curing period, the lime reacted chemically with the clay, reducing its plasticity and making it friable and readily compactible.

Following the second mixing, the clay-lime was compacted using double sheepsfoot and rubber-tired rollers. The degree of campaction required was 100 percent of maximum theoretical density. After compaction the stabilized layer was primed with asphalt emulsion, then cured for several days.

The clay for the second 6-in. course of stabilization was placed in much the same manner as the first course, except that no problems of break-through were encountered. The 13 cu. yd. wagons were able to operate in all areas without this problem. However, there was one difficulty after the clay was spread.

Showing dragline removing one foot depth of muck and organics.

Because the stabilized area was flat, and water could not run off readily, it was often necessary to wait a few days for the clay to dry out sufficiently for the lime trucks to negotiate the area. The clay had about 30 percent moisture when delivered, having been dug from a borrow pit which extended several feet below sea level. Once the lime was spread and mixed in, however, there was little trouble with subsequent rains.

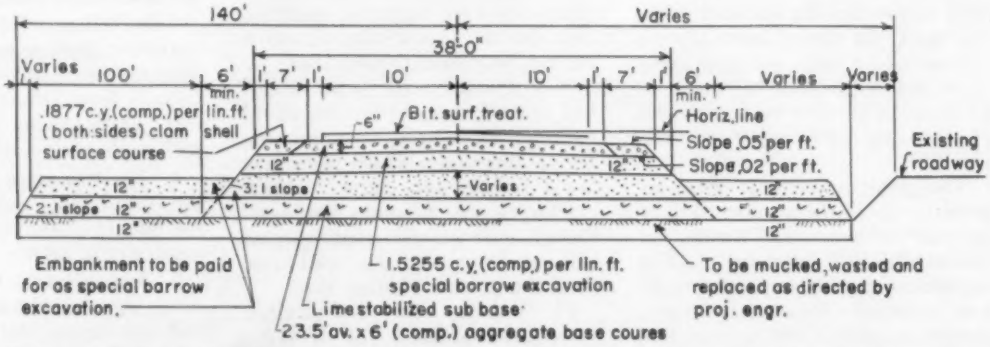
After the completion of the 12-in. soil lime stabilization, any type of equipment was able to operate throughout this section of roadway. The remaining foot of soil was then placed on the berm and the embankment was completed with only normal construction problems. The design for the swamp crossing included a 6-in. aggregate base course, 20-ft. wide bituminous surface, and 7-ft. shell shoulders.

Immediately after completion of stabilizing operations, subsidence plates were placed directly on the surface of the stabilized layer—on the centerline and near the edges of the berm at three locations along the roadway.

Test holes, after completion of the first layer of sand, indicated the average depth to be 2.5 feet rather than the desired 1.0 foot. The original quantity estimated necessary for the 1-ft. layer of sand was 112,011 cu. yd., whereas the actual quantity used was 280,509 cu. yd., or an overrun of 250 percent.

Indications at this time are that the new highway will perform satisfactorily, although it has been carrying traffic only since June, 1959. There is evidence of only 0.11 to 0.15 ft. of settlement since the completion of the soil lime stabilized layer in December, 1958, and the roadway is smooth with no evi-

Continued on page 189



This cross-section with minor variations gives the picture of the scheme to layering and the counterbalancing roadside courses adapted for blanketing over muck.

More Prequalified Road Contractors

Prequalification list has leveled off in most states following rapid influx of new or newly accredited firms

The number of firms prequalified for the role of prime contractors on state highway work across the nation has risen about 17 percent in the last three years, according to a *Roads and Streets* survey.

This figure does not reflect the number of contractors who actually bid on state road work, but it does indicate the increasing reserve of manpower and equipment for meeting Interstate needs in the coming years.

Of the 50 states, 44 require prequalification, including those which permit qualification at the time bidding proposals are presented. Six ask no prequalification.

The Interstate program continued to attract new entries in 1959 to the bidding for state highway work, the survey disclosed. An average of 24 firms per state came in as new bidders during the year. Of these, 25 percent were successful in capturing one or more jobs during 1959.

The great majority of states reported a rise in the number of their prequalified contractors during the period 1956-1959 following the first big fanfare over the expanded highway program. Some state rosters jumped more than 100 percent. But there were declines in other states.

California reports the greatest number of prequalified highway contractors—1,094. Other states at the head of this list include Illinois (600), Ohio (586), Oregon (531), Virginia (525), Iowa (520). Rhode Island (36) and Hawaii (25) have the fewest.

As expected, the chief reason for growth of the lists of prequalified contractors is the Interstate program. There are other reasons, however, most of them attributable to local conditions.

Florida's prequalified contractors have risen from 249 to 417 since 1956. The state road department credits two factors: the industrial and population growth of the state and its anticipated continued growth, plus the interest of large out-of-state firms. Contributing to the latter is the Interstate program and also the state's climate, which permits year-round operations.

The Florida State Road Board has recently revised qualifications for highway contractors, tightening regulations under which firms may bid for state job. State highway engineer Al Church has said, though, that the new qualifications will not remove any approved firms from the present bidding list.

In Vermont, where the number more than doubled (71 to 143), growth of other federal-aid highway projects is credited. Many of the nation's large contracting firms submitted prequalification requests in Vermont during the past three years and it is presumed that they are interested mainly, if not solely, in Interstate work.

However many new firms formed within the state have been prequalified that would not be in a position to undertake Interstate work. The reason behind their creation, according to W. B. McAllister, administrative assistant to the highway department's chief engineer, probably is the "significant increase in our regular primary, secondary and urban projects in the last three years, none of which, though, was of sufficient size to warrant a large contractor becoming prequalified for bidding on them."

The Michigan state highway department lists several reasons for the increase of its prequalified contractors from 318 to 469 in the past three years. Some of these reasons will apply also to other states:

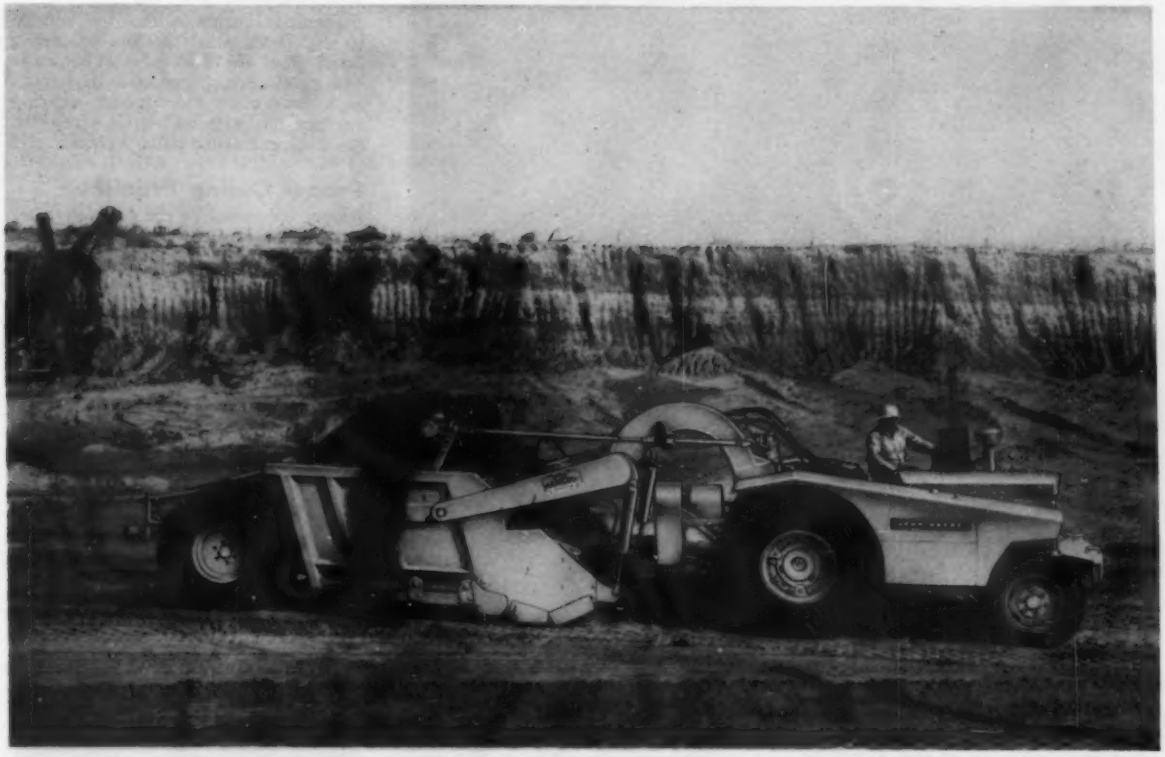
1. The Interstate program—" . . . the considerable publicity given to the program and to its large expenditure of money . . ."

2. Industrial and private work in the state has fallen off somewhat, and contractors doing such work are looking for other jobs to keep

Continued on page 121

The JOHN DEERE 840 with HANCOCK SCRAPER

Cuts roadbuilding costs from fill to finishing



No need to tie up a lot of high-cost equipment—the thrifty John Deere "840" Diesel with 7-1/2-yard elevating scraper takes over by itself—without a pusher. Slat-type elevator builds its own heaped loads—breaks up clay for fast hydraulic ejection, even spreads.

Preferred for finishing and street work, too, the unit U-turns within standard 30-foot curbs, and has a transport width of less than 8 feet.

Many contractors have purchased this equipment with the help of the John Deere Credit Plan. For the information you need, consult your John Deere Industrial Dealer through the classified telephone directory, or write direct today.

JOHN DEERE
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JOHN DEERE *"Specialists in Low-Cost Power with a Heavyweight Punch"*

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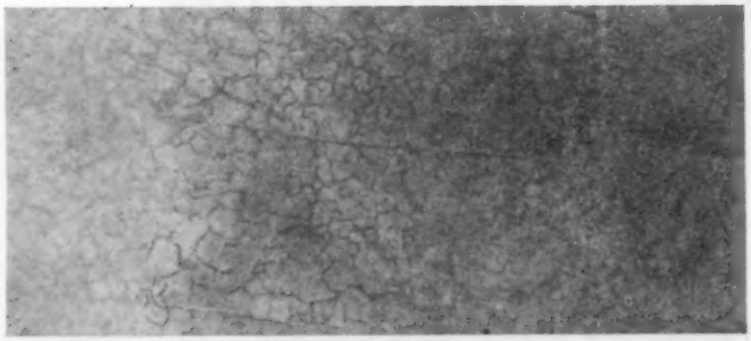
ALPHA

BETTER CONSTRUCTION THROUGH BETTER USE OF CEMENTS

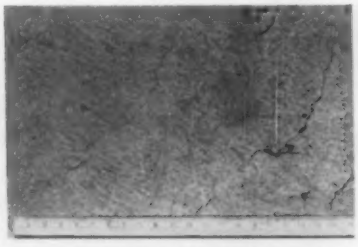
news and notes from the field

How to Avoid Crazing in Concrete Surfaces



CRAZING or map-cracking of a concrete surface. Excessive shrinking occurred before sufficient strength had developed to resist the shrinkage forces.

Crazing cracks which appear on the wearing course of concrete are superficial cracks that rarely penetrate deeply. They are caused by surface shrinkage resulting from improper finishing practices and/or inadequate curing.



PLASTIC SHRINKAGE CRACKS are often confused with crazing. Condition shown above occurs soon after or during finishing and results from early loss of mix water to dry subgrade, dry aggregates or to the air. They are much deeper and more widely distributed than crazing cracks.

Effect of Slump

The higher the slump, the greater the danger of over-troweling and bringing excessive fines to the surface of the concrete. High-slump concrete is also severely affected by improper curing. In general, it increases the probability of surface problems including crazing.

Dusting on Sand or Cement

The practice of dusting on dry cement to hasten drying and make finishing easier should *not* be followed. This produces a rich cement mortar wearing surface which will craze and very likely scale.

To confirm this, Alpha laboratory technicians made two slabs of the same concrete mix. The first sample was finished according to recommended and accepted practices and produced a smooth, hard, crack-free surface. In the second sample, dry cement was dusted on the surface, and it was not properly cured. This slab was not over-troweled. The results on this sample showed a perfect example of surface crazing.

Inadequate Curing

Inadequate curing causes the surface to dry faster and therefore to shrink faster than the bulk of the concrete. This produces a difference in movement at a time when the concrete wearing surface has attained little strength, resulting in hairline pattern cracks.

Proper Curing Practice

Proper treatment of the concrete after it has been finish troweled is most important in obtaining a smooth, hard, durable wearing surface.

1. Concrete must be kept moist so that cement hardens while continuing to combine chemically with the water.

2. Start curing process after finish troweling as soon as the surface is hard enough to resist damage.

3. Don't allow concrete to air-cure.

More Information

Send for the Alpha Craftsmanship in Concrete Folder #1 which presents much more data on "Steel Trowel Finishing". Reprints of this advertisement are also available on request.

ALPHA

PORTLAND CEMENT COMPANY

Alpha Building, Easton, Pa.

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PREQUALIFIED CONTRACTORS

Continued from page 118

their organizations busy.

3. An expanded program for the improvement of arterial highways not on the "I" system.

4. Many items of specialty work, such as electrical work and signs are now included in the general contracts; this work is subcontracted, and all subcontractors in Michigan must be prequalified.

5. General contractors, particularly on the larger projects, are subbing out many of the smaller jobs such as they used to do themselves. People in their organizations who once handled small projects have branched off and other small contractors doing this type of work have prequalified.

6. The increase in the size of contracts in the expanded Interstate and arterial programs has influenced some of the nation's larger "heavy" contractors to get prequalified for highway work; they may not necessarily bid, but they then are set if they want to.

7. The present tendency of the Michigan department to obtain the fabricated steel for structures by contract ahead of the general contract, has required that all firms bidding to furnish, fabricate and deliver steel for structures be prequalified.

What of those states where the number of prequalified contractors has dropped? Stricter standards are the principal cause, but here too are some auxiliary factors worth mentioning.

The influx of contractors on the coat-tails of the Interstate program has caused most highway departments to take a critical look at their qualification procedures. In most of these states, especially those with a smaller reserve of local contractors to draw on for "I" work, the number of prequalified contractors still has risen. But in some instances this tightening of standards has cut their numbers, removed the "chaff," as one highway department official put it.

A case in point is Ohio. Since early 1959 the prequalification procedures and policies in use in Ohio have been undergoing review in an effort to improve the "end results." This review is continuing at the present time, currently in discussions with the Ohio Contractors Association, in an attempt to arrive at agreement in matters of policy.

Added to this, though, has been a tendency by the Ohio department "to take a more critical attitude in applying the policies already in existence."

According to H. L. Krauser, en-

Continued on page 156

How Ranks of Prequalified State Road Contractors Have Grown

	Number of Prequalified State Highway Contractors 1956	1959	New Bidders 1959	Successful New Bidders 1959
Alabama	269	292		
Alaska		see foot note (1)		
Arizona	73	105	10	3
Arkansas	171	223	28	9
California	812	1,094	16	4
Colorado	135	161	17	4
Connecticut	274	290	33	7
Delaware	57	125	12	1
Dist. of Columbia		(2)	40	8
Florida	249	417	30	7
Georgia	253	262	12	5
Hawaii		23	2	0
Idaho	250	310	3	1
Illinois	457	600	71 (3)	9
Indiana		328	36	4
Iowa	426	520	48	21
Kansas	282	293	14	2
Kentucky	300	431	26	5
Louisiana	69	150	15	15
Maine	77 (4)	75 (4)	13	3
Maryland		304	85	3
Massachusetts		250 (5)		7
Michigan	318	469	73	18
Minnesota	175	(2)	44	12
Mississippi	264	183	11	2
Missouri	283	296	26	12
Montana	158	181	35	5
Nebraska	210	276	8	2
Nevada	71	100	3	0
New Hampshire	100	121	14	2
New Jersey	240			
New Mexico	72	97	4	2
New York		160 (5)		
North Carolina	164 (6)	195	33	7
North Dakota	129	160	27	5
Ohio	645	586	40	28
Oklahoma	178	182	0	0
Oregon	510	531	32	9
Pennsylvania	153 (4)	271 (5)	58	16
Rhode Island	52 (4)	36 (4)	0	0
South Carolina	208	281	19	8
South Dakota	181	191	7	0
Tennessee		354	15	8
Texas	303	360	28	8
Utah	110	140		
Vermont	71	143	16	5
Virginia	407	525	10	2
Washington	432	511	51	9
West Virginia	191	222	9	1
Wisconsin	327	392	46	5
Wyoming	130	170	27	11
	10,236	12,765	1,179	295

(1) Presently engaged in preparing prequalification standards.
(2) Prequalification not required.
(3) New firms prequalified, not all of which bid during the year.
(4) Prequalification not required; this is number of firms bidding during 1959.
(5) Prequalification not required; this is estimated number of firms bidding during 1959.
(6) Including 46 house movers.

Looking West toward George Washington Bridge. Depressed grade fully excavated. Footing for retaining wall completed in foreground; being poured in distance. Utility lines (upper right) sheathed in planks for protection. Wall form panel assembly begun on the ground below.

TRENCHING 12 LANES

Continued from page 56

utilities involved; the close proximity of subway tunnels and bridge approach tunnels on both sides within 9 ft. of excavation limits—made this very tight control mandatory.

Rock drilling is governed by the Industrial Code Rules Relative to the Control of Silica Dust in Rock Drilling, Bulletin No. 33, effective May 1, 1937 of the Board of Standards and Appeals of the New York State Department of Labor. L&J Contracting Co., blasting subcontractors, used dust collectors as part of this requirement.

No blasting was permitted within 15 ft. of the exterior construction of the Eighth Avenue subway tunnel without written permission from the NYC Transit Authority. Such blasting was carried out only after telephone communications were provided to allow Transit Authority personnel, stationed on the work and in the subway tunnel, to control subway traffic so that no trains were in the area at blasting time.

Several foundation piers for the bus terminal were located within 8 to 18 in. of the subway tunnel walls. Line drilling of perimeter holes on 3-in. centers, together with lightly loaded holes, confined the effects of blasting so that no damage resulted.

Continued on page 125

(Left and center): Excavating blasted wall footing trench; Northwest pullshovel loading Mack trucks, Traxcavator aiding cleanup. (Right): Ingersoll-Rand drill working in pocket between rock sills which were left to support utility underpinning. (See big water pipe overhead.)

"We tried several big haulers... and the 65 Payhauler® tops 'em all!"

New Hope's "65's" speed full 19-ton loads of dolomite from quarry to 300-ton-per-hr. capacity crusher—with a maximum climb-out grade of 16% and an 800-ft. haul! The 250-hp "65" travels up to 36 mph.; the 375-hp "95" up to 38 mph.!

—New Hope Crushed Stone & Lime Co., New Hope, Pa.

"Before buying two International® 65 Payhauler trucks, we had demonstrations by several large haulers," reports Edgar N. Putnam, for New Hope Crushed Stone & Lime Co.

"The '65' topped them all for production, ease of operation, and all-around efficiency. Main '65' features are ample power, balance for full-load delivery, and genuine operating ease and safety."

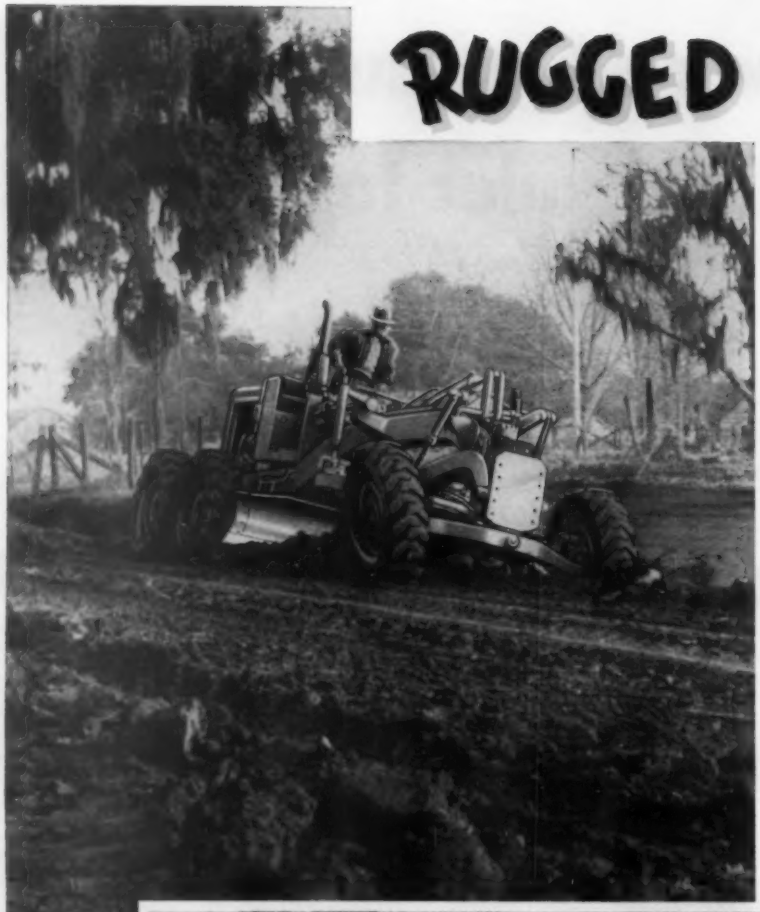
Both the 19-ton 65, and 27-ton 95 Payhauler trucks have the strength-multiplying International corrugated body design—that sheds weight, increases capacity. The direct-start International "817" engine super-powers both "65" and "95"—to outspeed former models, up to 40%. And both "65" and "95" highball full loads safely with reserve-area braking and new course-holding power-steering!

Compare—prove on the job that Payhauler gives you top off-road capacity; top power-to-weight ratio; top profit-earning ability! Let your International Construction Equipment Distributor demonstrate!

Get 11-second Payhauler dumping with exclusive inverted hoist body-positioning. Positive up-and-down snubbing control prevents machine-mauling dumping impact!

International®
Construction Equipment

International Harvester Co.,
180 North Michigan Ave., Chicago 1, Illinois
A COMPLETE POWER PACKAGE



RUGGED JOBS - *demand a* RUGGED GRADER...

This GALION Model 160 Motor Grader demonstrated its ruggedness on state project 400-04-04, St. Martinville-Parks, Louisiana, on January 10, 1959.

The contractor bought it after seeing this demonstration, and reported on October 8, 1959, "The job is now complete. This grader has been used on three other projects with the same satisfying results. There has been no down time due to repairs."

GALION Model 160 is an Extra Heavy Duty Motor Grader with 160 hp Cummins Diesel Engine, constant mesh transmission and full hydraulic controls. Its weight is 30,020 lbs. with scarifier.

Write now for complete specifications on this outstanding heavy duty profit maker for rugged jobs—or any grader jobs. It has an extra width, extra length Hydraulic Shiftable Moldboard as standard equipment, and the exclusive Hydra-Tilt Moldboard is available for varying the pitch hydraulically from the operator's platform — ideal for mix-in-place and material spreading jobs.

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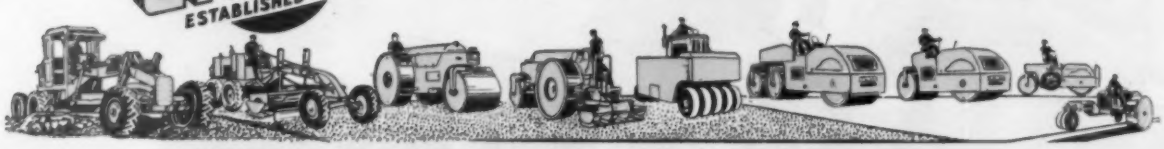
MOTOR GRADERS & ROLLERS
VIBRATORY COMPACTORS • PNEUMATIC TIRE ROLLERS



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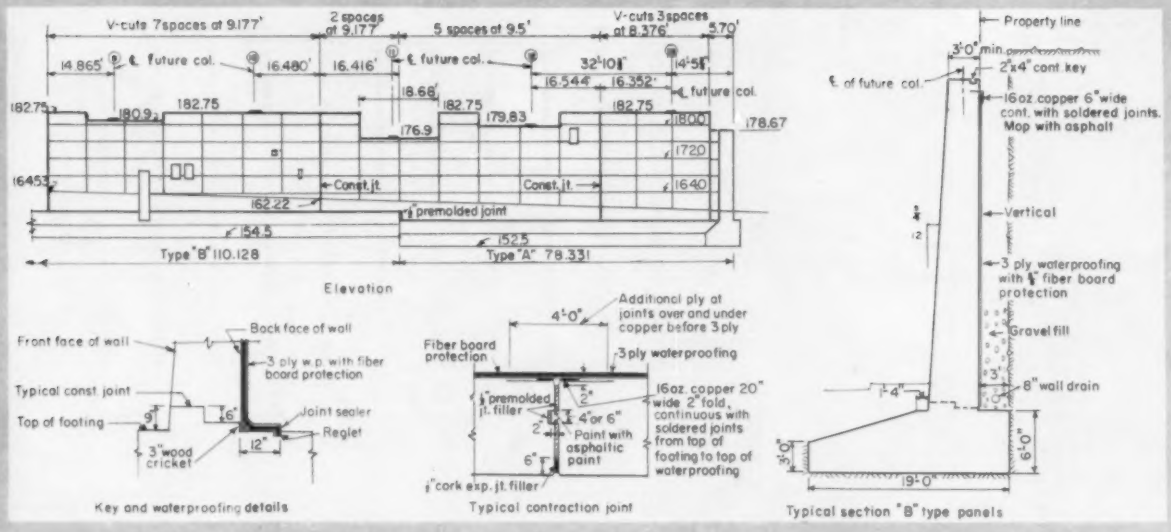


Design details for a typical series of panels, north retaining wall, showing the heavy cross-section dimensions and the scheme for architectural marking using V-strips nailed inside the outer form.

TRENCHING 12 LANES

Continued from page 122

Three Gardner-Denver 600 compressors have supplied five Gardner-Denver and Ingersoll-Rand drill rigs, working with Timken 2½ and 3 in. hard rock bits. Hand drills were used to trim existing masonry and pocket area. The L&J firm handled its own bit sharpening (estimated cost $1 to $1.50 per bit).

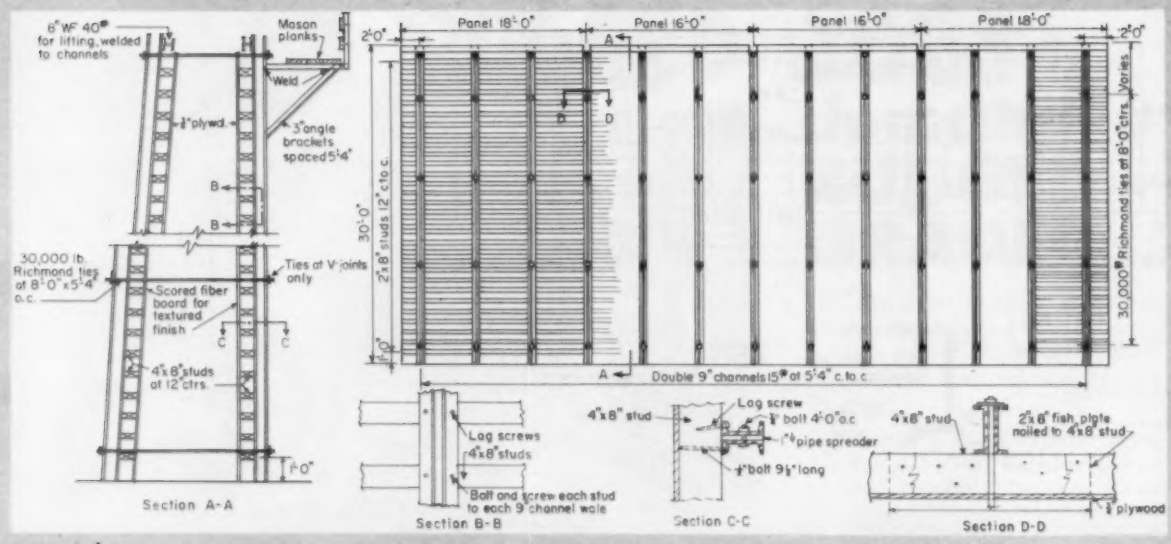
"Pay Line" Drilling. Line drilling was done to confine the blast effect to exact excavation pay lines. This technique called for drilling unloaded holes on about 3-in. spacing along the pay line. Holes to be loaded were drilled about 1 ft. back of the line holes at 3½ to 4 ft. centers. Wherever possible, holes were drilled full depth (22 ft. or so).

Loading of holes varied greatly according to the seam and the proximity to tunnels and utilities. Frank di Pietranton, L&J's superintendent, reported using from 14 to 20 8" x 1¼" sticks of 40 percent gelatin per 22-ft. hole. Safety and pay-line control were the primary consideration but the yield was still somewhat less than 1 cu. yd. per lb. of explosive.

Storage of explosives was also carefully controlled by the specifications. Drawings showing the location, size and capacity of the magazines (one each for explosives and detonators) had to be submitted for Port Authority approval. Only licensed employees conld engage in blasting.

Also, each magazine had to be attended by a licensed magazine keeper at all times when explosives were stored on the job. No explosives were kept on the job overnight. In several instances L&J shut down rather than bring in explosives that might entail over-night storage. A normal day's drilling required about 300 lb. of explosives.

(Left): Gardner-Denver 600s supplied the drilling. (Center): Assembling a big wall form panel. (Right): Positioning and anchoring a big retaining wall form panel for the next pour.



Typical of the detailed form design developed by the contractor, as a contract requirement as well as essential part of the job procedure.

Woven cable mats, 14 ft. square and weighing 2½ to 3 tons, were used to confine the blasting. Electric blasting caps ranging from instantaneous to No. 6 delay were used.

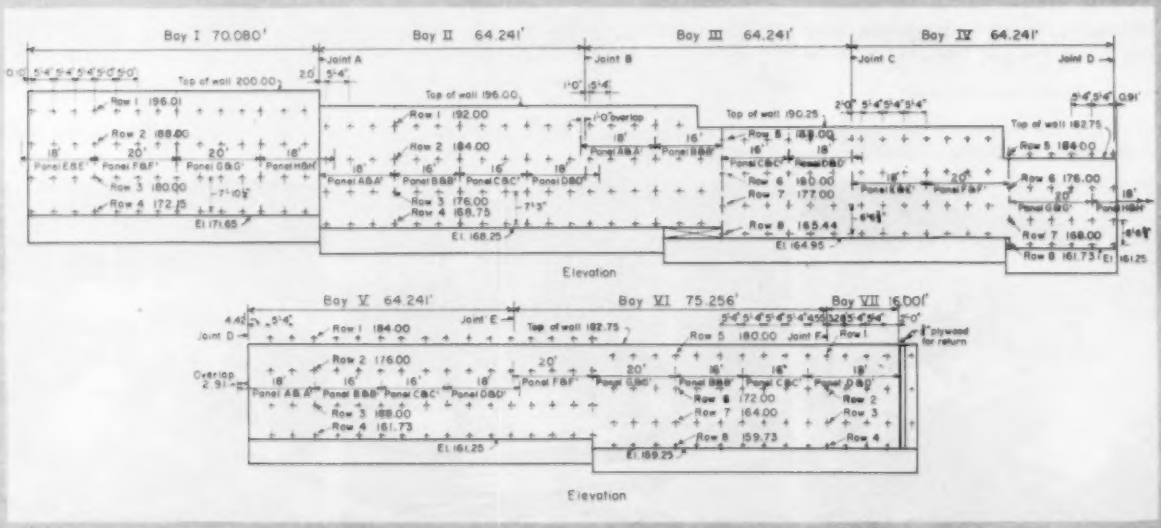
Excavation. General excavation material was trucked to a public park across the bridge in New Jersey for disposal. Debris and wall footing excavation material were loaded into Macks by a Cat Trax-cavator, with a P & H shovel handling the rock loading.

Breen Bros., the trucking subcontractor left a ramp-type haul road at one point for the rock trucks, until the rest of the area was down to grade. He then built a ramp west of Wadsworth Avenue so that the Broadway ramp rock could be removed. The Wadsworth Avenue ramp will remain until completion of the new Broadway Bridge allows direct construction access to the George Washington Bridge off the west end of this project.

Retaining Walls. One of the major construction items now nearing completion is the forming and pouring of large retaining walls along the depressed expressway.

Continued on page 128

Details taken from one of several sheets prepared by the contractor to guide the form erection crew step-by-step in form use and re-use.



CHARLOTTE, NORTH CAROLINA—Blythe Brothers Company, general contractors, used their Huber-Warco 10-12 ton three wheel roller to compact "black base" on their section of Interstate Highway #26 near Columbia, South Carolina.

HUBER W WARCO

HUBER-WARCO *3 wheel rollers*

SIZES FROM 10 to 14 TON

Huber-Warco 3-wheel rollers are made in General Purpose, Finishing, and Variable Weight models to fit every 3-wheel roller need.

TORQUE CONVERTER tailshaft governor and two speed transmission are standard. Doubles available power, cuts fuel costs, increases life of machine components one-third to one-half.

SPECIAL SUB FRAME suspended at three points carries engine and transmission assembly and cushions outside shocks to increase machinery life.

GUIDE ROLL assembly has tapered roller bearings and is completely adjustable. Retains factory new adjustment indefinitely. Kingpin housing is removable.

OTHER FEATURES include replaceable tire design, differential lock, variable speed hydraulic steering, pressure sprinkling system, choice of gasoline or diesel engines.

A trusted product name backed by respected distributor names from coast to coast

MOTOR GRADERS

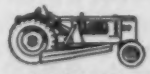
Standard transmission models from 83 to 160 H.P. Torque converter and power shift transmission models from 102 to 195 H.P.

TANDEM ROLLERS

3-5 Ton • 4-6 Ton Retractable • 5-8 Ton • 8-10 Ton • 8-12 Ton • 10-14 Ton

3-WHEEL ROLLERS

10-Ton • 12-Ton • 14-Ton Standard Weight 10-12 Ton • 12-14 Ton Variable Weight



MAINTAINER

M-52 — 45½ H.P. Attachments are Lift-Loader, Broom, Bulldozer, Patch Roller, Scarifier, Snow Plow, Berm Leveler

HUBER-WARCO COMPANY **Marion, Ohio, U.S.A.**

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TRENCHING 12 LANES

Continued from page 126

These walls, heavily reinforced, vary in height to 30 ft., averaging about 20 ft. Brookfield was required to submit detailed drawings of both the concrete pouring schedule and the forms to be used.

Heavily reinforced concrete footings, ranging from 4 to 6 ft. thick by 15 to 19 ft. wide, are set in trenches blasted out of solid rock. Footing elevations are stepped at 27 to 70 ft. intervals, to conform to the roadway grade line.

To form the "textured finish" wall exteriors, Brookfield is using ¾ in. plywood forms lined with tempered pressed fiberboard, reversed so that the textured side is against the concrete. The exposed face is patterned into 4 ft. high by 8 ft. long rectangular panels with all horizontal lines continuous and level.

The 2,500 ft. or so of walls in the job are being constructed in a tightly planned and scheduled sequence using only two sets of forms. The form design was based on the use of Richmond 1¼ in. T4 form ties. These ties have a guaranteed safe load rating of 36,000 lb. (Brookfield's working stress, 30,000 lb.). In the design of the forms, the contractor, used Richmond's spacing chart (1958 Richmond handbook) based on concrete poured at 70 to 80 deg. F., allowing for a maximum possible vertical pour of 8 ft. per hour. Ties are spaced so that every one is located in a V joint of the textured rectangular pattern, thus reducing surface patching of the textured finish to a minimum.

A set of forms has consisted of 4 panels, made up of two elements 16 ft. wide and two 18 ft. wide by 30 ft. high. Double 9-in., 150-lb. channels on 5-ft. centers provide vertically against bulge. And 4″ x 8″ studs running horizontally on 12-in. centers prevent bulge between the vertical member. The ¾-in. plywood is nailed over the studs for both front and back forms. Tempered pressed fiberboard is nailed over the plywood with the textured side against the concrete to produce the textured front finish. The use of 4′ x 8′ fiberboard sheets has allowed all joints to be covered by V strips. Fiberboard is replaced after each pour.

Sequence of Forming and Pouring the Wall Shown in Figure 1

As detailed on construction plan sheets furnished by Brookfield Construction Co. for its own field use and in compliance with job specifications.

1. Starting at Joint "A", erect panels A & A'; B & B'; C & C' and D & D' in order as shown. Place ties where indicated. Pour Bay II.
2. Starting at Joint "C", erect panels E & E', G & G' and H & H' in order as shown. Place ties where indicated. Pour Bay IV.
3. Strip Bay II and use panels in order shown for Bay III. Note: panel A & A' overlaps Joint "B" by 1′ 0″. Place ties where indicated. Pour Bay III.
4. Strip Bay IV and use panels in order shown for Bay I. Note: panel H & H' overlaps Joint A by 4′ 0″ making it possible to catch existing ties in Bay II. Place ties as shown. Pour Bay I.
5. Strip Bay III and use panels in order shown for Bay V. Note: panel A & A' overlaps Joint D by 2′ 11″, making it possible to catch existing ties in Bay IV. Place ties as shown. Pour Bay V.
6. Strip Bays I and V and use panels in order shown for Bay VI. Note: panel F & F' overlaps Joint E by 1′ 2″ making it possible to catch existing ties in Bay V. An auxiliary channel or blocking at each tie will have to be used so that the washer for the tie bolt will have proper bearing. Place ties as shown. Pour Bay VI.
7. Form and pour Bay VII.

The first step in form assembly is the construction of a temporary level platform on the excavated roadway area. Next, the double steel channels are accurately laid out on the platform. Then the studs are placed in position over and perpendicular to the channels, and ⅝ in. holes drilled through the studs and one side of the channel. Holes are countersunk to take a ½-in. bolt head and washer, allowing the stud to be bolted to the channel. After the studs are bolted, the plywood is nailed to the studs.

A working platform (shown in one of the pictures) is welded in place after the form is erected. Its 8-in. WF 40-lb. members are welded along the top for lifting.

The finished panel, weighing from 7 to 10 tons, is lifted in place with a Bucyrus-Erie 45-ton truck crane. Form panels are set in place on the footings, relying largely on their weight to hold them in place. The back form is placed first and braced in place at the bottom. Turnbuckles and anchored cables at the top are used to secure accurate alignment. All heavy reinforcing steel is placed before the front form is erected. The wall width is sufficient to permit use of scaffolding after the front form is in place.

The next operation is to nail the fiberboard to the front form—then electrical fittings & conduits are installed. The last step is to place the face steel using Richmond ties as spacers.

The 4′ x 8′ rectangular pattern on the exposed face is accomplished by nailing V strips to the fiberboard face, just before the face steel is placed. Placing of the fiberboard and V strip has had to be coordinated so that the V strips cover all fiberboard joints. The accuracy of this operation is insured by setting elevations with a transit.

The 4′ x 8′ fiberboard sheets have worked out well for the textured finish and the rectangular pattern. Since the sheets are replaced after each pour, it has been relatively easy to control the exact spacing of joints and V stripping. Brookfield's engineers feel that the large form sections as used here would be even more practical on a longer job. Two sets of forms, one for each side, are proving adequate because of the numerous situations which arise to prevent higher speed in wall construction.

Pouring Wall Concrete. Concrete for walls and footings is truck-mixed at the job under close inspection for water-cement ratio and mixing time. Weather and variable working conditions have precluded

Continued on page 156

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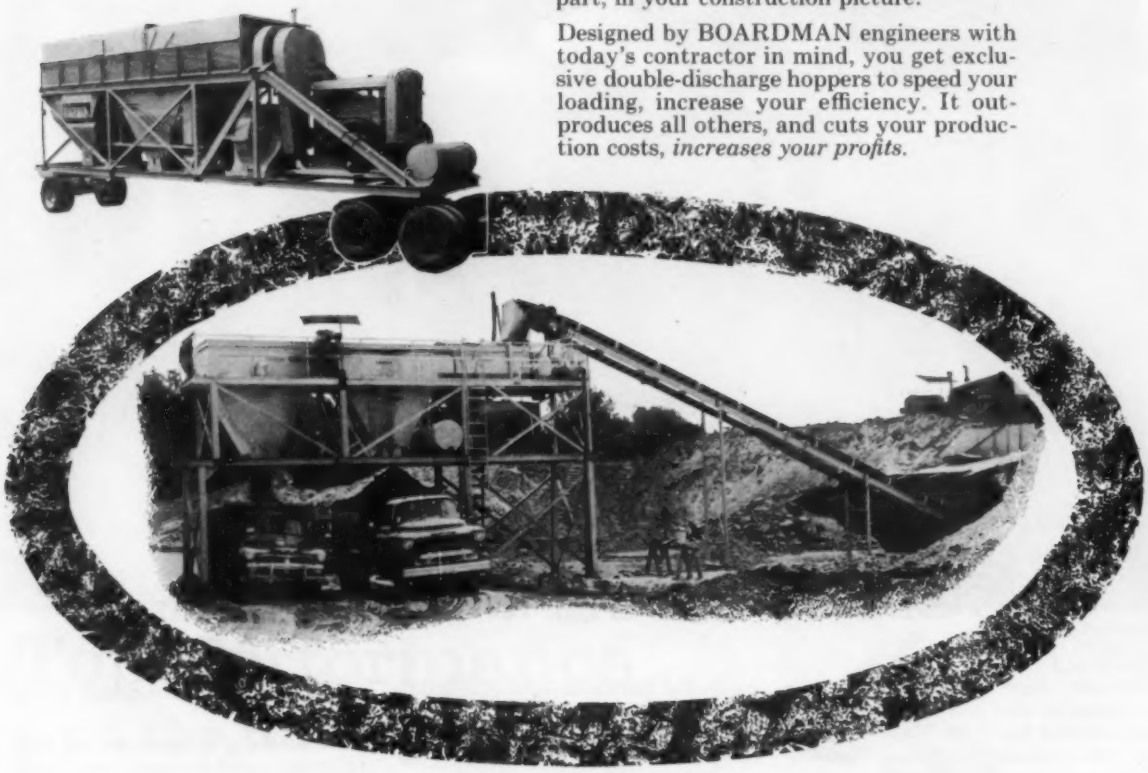

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Guardkote 140 is a black system, and Guardkote 120 is an essentially clear compound that can be color-matched to conventional paving materials. Based on Epon® resin, these products are two-component fluid systems. When the components are mixed, they form a tough aggregate binder.

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Figure 7—A contractor often assembles his own lube truck. (Courtesy Schmidt Construction Co.)

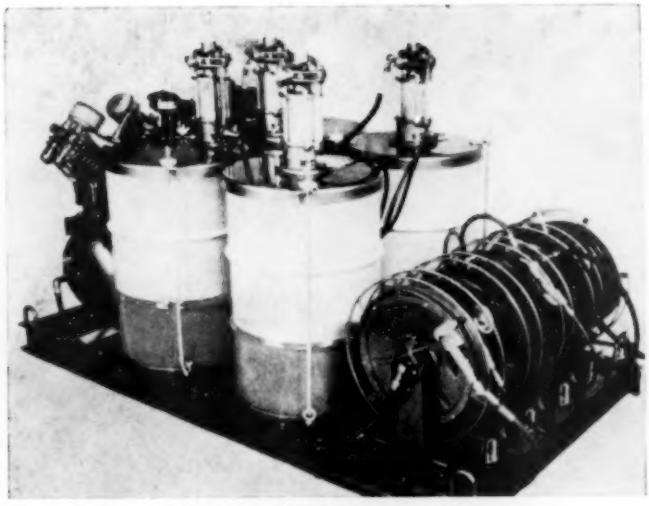

Figure 8—A complete skid-mounted lubrication rig ready for use in either a truck or stationary location. (Photo courtesy Stewart-Warner Corp.)

MOBILE LUBE EQUIPMENT

Continued from page 61

well as anchorages for the tie down cables. Drums, tanks, and locations should be well marked to avoid misapplication.

2. A supply of water for radiators. Water is usually blended with rust inhibiting soluble oil or antifreeze.

3. Properly identified hose and reel assemblies with metering devices, if desired.

4. Small supplies of solvent (for air filter cleaning), miscellaneous specialty lubricants and brake fluid.

5. An air compressor to operate the dispensing pumps and inflate tires.

6. A generator to operate floodlights.

7. Optionally a supply of fuels for "topping" i.e. refilling fuel tanks.

8. Miscellaneous tools, oil and fuel filters, fan belts, grease fittings and adaptors will usually be found in a body-hung cabinet.

In general the basic lube rig is an assembly of standard commercial dispensing equipment modified to fit specific requirements. The equipment can be mounted on a variety of different chassis as shown in Figures 2 through 6. The contractor can also assemble his own equipment as seen in Fig. 7 or he may purchase a skid mounted rig, similar to the one in Fig. 8, for application to a flat bed truck.

Fuel and Lubricant Requirements

Major projects are seldom located in an area convenient to the basic needs of fuel, lubricants, and water. Water may be near at hand or it may have to be trucked in by tank wagon (a highly expensive operation). Fortunately the fuel and lubricant supply can be arranged for with much greater assurance. The site is reviewed by the lubrication engineer and the contractor representative of the petroleum supplier. After consultation with the contractor or his superintendent, and utilizing knowledge of the types of equipment to be used, a program is worked out to serve the contractor's best interests.

Contractors, equipment and manufacturers, and the petroleum industry have worked closely over the years to provide the best lubrication. Constant development and recognition of this requirement have produced simplified lubrication plans which provide positive programs with a minimum number of quality products and consequent lack of confusion. The Lubrication Engineer is well qualified to develop such a program to fit any type of operation. Experience has indicated that over 90 percent of the equipment in service can be lubricated with two lubricating oils, two greases, and a gear oil. The basic ingredients of a simplified plan are the following lubricants.

Heavy Duty Diesel and Gasoline Engine Oil. The oil must provide engine cleanliness, resist oxidation, have high film strength, prevent bearing corrosion and foaming, and have rust protection properties. Such oils are readily available and meet MIL-L-2104A, Supplement 1, and MIL-L-45199 (Series 3) specifications. Many contractors find the use of a Series 3 oil most convenient as it is suitable for turbo-charged engines as well as most other types.

Premium Quality Hydraulic Oil. Hydraulic oils must transmit power smoothly and efficiently. Proper viscosity is necessary to lubricate and provide minimum friction and leakage. Good chemical stability is required to resist oxidation, varnishing, sticking and foaming. While an SAE-10W motor oil meeting MIL-L-2104A requirements is widely used, a specialized rust and oxidation inhibited hydraulic oil

Figure 9—Lube service adjunct—a complete self-contained fueling facilty ready for immediate independent use in the field.

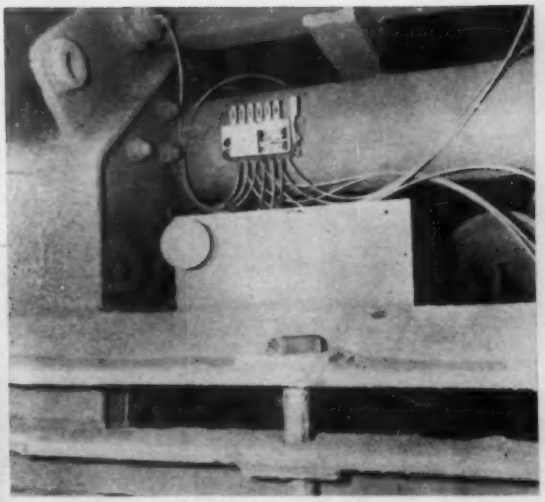

Figure 10—A centralized lubrication system on a heavy dump truck. One application of a lubricant gun to the manifold delivers measured amounts of grease to 12 different lubrication points. (Courtesy of The Farvall Corporation.)

is even more satisfactory.

EP Gear Oil. The heavy shock loads and high temperatures usually require an oil meeting the MIL-L-2105 specification, and the SAE-90 grade has found favor with most contractors. The GL-4 type may be required for some equipment. Gear lubricant is an important item and should always be discussed with the Lubrication Engineer and equipment manufacturer before installing in equipment, as severe damage can result if the wrong type lubricant is applied.

Multi-Purpose Grease. This product is another major key to simplified lubrication. Today's multi-purpose grease covers wide ranges of temperature, loads, and speeds not believed possible a few years ago. It can be used in applications formerly requiring several specialty greases and often provides lubrication superior to the previously used products. The features of pumpability, compatibility, oxidation and water resistance as well as shear stability are built-in qualities rather than happenstance.

A multi-purpose grease is generally of the lithium soap base type and is available in both the NLGI zero and two grades.

Track Roll Lubricants. The "sealed for life" track roller assemblies now available on the newest equipment will relieve the contractor of a heavy burden of lubrication. However, older equipment presently in use must still be serviced and a good track roll lubricant or (in some designs) a good multi-purpose grease will provide requisite lubrication and sealing.

Specialty products also may sometimes be needed. These can usually be incorporated without disturbing the advantages of the simplified program.

The Actual Lubrication

The job of lubrication to be done effectively and efficiently must be a planned operation. It is of little benefit to have modern dispensing equipment and premium lubricants, if critical bearings are missed or neglected. Lax practices lead to repairs. Lubrication charts are available (usually from the equipment manufacturer). These charts indicate the points of lubrication, type of lubricant to be applied, and frequency of application. The well-trained operator soon commits to memory the details of his equipment, but his lube truck will always have the necessary charts conveniently located.

If a contractor is to know and follow the maintenance of his equipment, a concise daily record is necessary. The record need not be complicated but must contain information to identify the unit serviced, total engine hours, quantity and type of fuels and lubricants applied, and possibly information on tires, batteries, and inspection. A serviceable type of record card can be made on heavy grease-resistant paper. A daily review of the record card will quickly indicate excessive consumption, over or under lubrication, and possible distress of equipment. Equipment identification is usually recorded before servicing begins so no unit will be neglected.

How and when lubrication takes place depends upon the project's nature. A one-shift operation with mobile-type equipment permits assembly of the equipment in parallel columns near the work site. The lubrication will generally take place at night, thus the need for floodlights (miner's cap lights found useful by one large contractor). The one-shift job gives more time for inspection and

Continued on page 163

One pusher: 22.0 pay yards, 45 seconds

600 hp Michigan Dozer

When C. L. Hubner Company, Denver, won a pair of adjacent contracts totaling 14.3 miles of divided highway in northern Colorado, they were faced with 2.4-million yds of unclassified excavation. Much of the borrow had to be taken from the *bottom of a flowing creek*. Should they use draglines and separate haul units or pump the water out and use a pusher-scraper fleet? Economics dictated scrapers.

The stream was ditched and water pumped out by sections as a pair of big crawlers, working in tandem, push-loaded 27 yd scrapers. But this method of pushing was costly and Chuck Loser, Project Supt, wanted faster production. For a year now, his company had owned a Michigan Model 480 Tractor Dozer. It was working in another pit. They called it in.

600 hp Michigan Tractor Dozer steps up production

The question was, "Could the rubber-tired Michigan work in the wet, sandy clay?" Its 600 hp was greater than that of the two crawlers combined. Its 104,000 lb operating weight was about equal to that of the two crawlers combined. With power shift and torque converter, dozer-to-scraper contact was smooth. The wide-base, hydroflated 33.5-33 tires took hold. And the Michigan, alone, did what previously took two big crawlers. Another production problem was solved.

Output of one Model 480 leads to purchase of another

For the first time, the firm had found a pusher that could *by itself* effectively load their big 27 yd scrapers under almost any condition. Later, after many months of experience with this Michigan, Supt Loser said, "Our Michigan many times has demonstrated its ability to handle large scrapers. Its speed, torque converter and power-shift transmission have sure helped us increase production." It only seems logical, af-

replaces tandem-crawler team

ter this experience, that a firm of Hubner's size could benefit by owning *two* Model 480's. And they have. A second Michigan was recently purchased.

2 Michigans load 12 scrapers

The two Michigans today often load a fleet of 12 to 13 scrapers on haul cycles from 600 feet to 6 miles. Pushing 27 yd scrapers, each Michigan regularly loads a scale-weighed average of 22.0 pay yds. Load time averages 45 seconds. Material has been generally sandy clay, similar to that found most anywhere in the country.

Time study shows $60 per hr advantage

Michigan efficiency has proved equally impressive with medium-sized scrapers. One day a 65,000 lb crawler, working on another spread, broke down. With truck-like, 28 mph mobility, one of the Michigans sped to the job location and took over. Time studies showed that in the same location, loading the same rough, rocky earth, servicing the same four 19½ yd scrapers, the Model 480 shoved off *four more loads per scraper per hour.* Total: 16 more loads! Conservative load size: 15 pay yds. Figuring 25c dirt, *the faster-pushing, faster-backing Michigan was earning an extra $60 per hour compared to the crawler!* And this doesn't even count the 2 or 3 extra bank yards the project supt says the Michigan often loaded.

If you have similar big-yardage scraper or dozer jobs, perhaps mobile Michigans can give you similar cost-cutting advantages. Besides the 600 hp Tractor Dozer there are 375, 262, and 162 hp models. Call us for a no-obligation demonstration on your job.

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High-traction Michigan Tractor Wagons to the rescue

Solved—slow-up due to unexpected plastic clay

The term "unclassified excavation" can mean many things when applied to earthmoving in Vermont's mountain-rimmed Winooski Valley. It *could* have meant chaos to S. V. Rossi Construction Co, Inc, Torrington, Connecticut, one of 11 prime contractors working in the Valley on Interstate Highway 89.

At first, there wasn't even a hint of the trouble ahead. Rossi's job along the 11½ mile, $16 million route into Montpelier *looked* like the "perfect" intersection. Soil tests showed typical Vermont slate and shale, gravel, sand, light clay and topsoil—520,000 yds in all. All hauls were downgrade (average 2%). With luck, the project would balance up without borrow. And ample time was allowed for completion.

Under these conditions, the only new equipment purchased was from Michigan Distributor, Interstate Equipment and Supplies Co, Montpelier—a pair of Michigan Model 210, 25 ton Tractor Wagons. These rear-dump units were to be used primarily as rock haulers, replacing four 17 yd wagons of another make.

Michigan wades through hub-deep muck

Work went as planned for several weeks . . . then came the emergency! Oozing blue plastic clay, some 75,000

yds of it, all located in one 70 foot deep cut! After a quick conference, it was decided to *try* dozer-feeding a swing shovel and loading most material into the pair of 25 ton Michigans.

So the dozer, shovel and 262 hp Tractor Wagons went to work. With their wide-base high-traction 29.5-25 earthmoving tires on the prime mover and like-size rock tires on the wagon, the Model 210's waded hub deep into the oozing clay, were loaded, then pulled themselves out for the half-mile run to the fill. Dump was made "sandwich-style," alternating clay with rock from another cut.

Clay: 2,000 pay yds per day

In an average 10 hour day, the two Michigans thus made a total of 94 trips, moving between 1,500 and 2,000 yards of paydirt.

By working in conditions that "swallow up" most other equipment and traveling at speeds up to 31 mph, the Model 210 Tractor Wagons helped solve a problem which could have caused a serious setback. Additional equipment, originally thought necessary, was not needed.

Charles Rossi, Project Supt, says, "After the blue clay episode, we were still a good 10 per cent ahead of original schedule."

Emergency over—Michigans return to rock haul—average 3,250 tons per day

Rossi was quick to get the spread back to normal operation. The Tractor Wagons returned to their quarter-mile shot-rock haul. Each Michigan here made 65 trips a day, averaged 25 tons per load. Total daily production for the pair—3,250 tons.

Save 25% in fuel

Soon, another saving was noted. Because of the downhill haul, fuel consumption was expectedly lowered on all machines. But the 262 hp Michigans in a 10 hour day burned only 45 gallons each. Smaller 165 hp rear-dumps averaged 60 gal each.

Set a demonstration date

Perhaps Michigan Tractor Wagons could cut your costs, too. See for yourself. Choose from two models—162 hp, 13 ton or 262 hp, 25 ton—then call us for a no-obligation demonstration.

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Maintenance of the haul road is as important as its construction. A motor grader, properly used, can keep the road clean, preventing the buildup of knobs and resulting corduroy roadways. Blading should be deep enough to even the road—not just shove dust into the holes.

It Pays to Have Good Haul Roads

Your present "good enough" haul roads may be loosing you profits

By John Radomsky
Supervisor, General Construction Division, Sales Development Division, Caterpillar Tractor Co.

Material movement is the heart of the road-building and other earthmoving jobs. Transport of large yardages, quickly and inexpensively, is one of the most pressing problems facing contractors today. How efficiently a contractor *hauls,* often largely dictates his profit.

One answer lies in large, fast, efficient earthmovers. But the potentials of these modern machines have been only partially utilized due to a widespread inattention to the *roads they travel.*

To handle today's jobs, contractors have demanded machines capable of high production. Scrapers must have fast travel speeds and large capacity; pusher tractors, the power to load scrapers in less than a minute. High production per unit has become the byword in the profit struggle.

Although attention has been focused on the haul units, comparable thought has not always been

given the haul roads. Heavy loads at high speeds punish haul roads, demanding solid footing, shallow grades, gradual curves and good traction. Contrary to a still-prevailing attitude, such roads are not an expensive luxury, available only to permanent operations. A carefully devised haul road can be profitable on a short-time job and can pay for itself many times over with its contribution to economical high production.

1. Rolling Resistance. Underfoot conditions are measured in terms of rolling resistance, or the drag on machine from the inability of the road to support the weight. With today's high axle loadings, it is becoming a serious problem to keep rolling resistance down to acceptable levels. This problem becomes acute in sandy and swampy areas.

Under most conditions, rolling resistance can be reduced by mechanical compaction or the use of calcium chloride or cement. It becomes increasingly more difficult and expensive to further reduce rolling resistance as it approaches the resistance value desired—40 lb. per ton of weight. Normally, experience and common sense can be used to judge the rolling resistance desired for particular job conditions.

Many haul roads have soft spots, caused by poor drainage. Culverts and fill material can be a good investment, particularly if a storm causes some spots to soften and bog down machines while the rest of the road is firm.

2. Grades as a Factor. Modern diesel engines can speed heavy loads over the haul roads, but their performance is reduced by grades of any magnitude. Long, steep grades can slow highspeed machines to

Continued on page 143

Steel members provide better clearance, faster construction on Brady Street Interchange.

Brady Street Interchange, Pittsburgh, Pa., part of the $100 million highway job, carries the Penn Lincoln Parkway and U. S. Routes 30 and 22.

Keep our roads on the GO

Steel is used for 80% of the bridges

designed by Richardson, Gordon and Associates, Pittsburgh, Pennsylvania

By using steel for the nine structures comprising the complex Brady Street Interchange in downtown Pittsburgh, Richardson, Gordon and Associates avoided extra engineering costs, kept traffic tie-ups to a minimum, and held grades within practical limits. The hilly terrain in Pittsburgh imposes severe restrictions on the designer. Steel saved valuable inches of clearance, and every inch saved meant improved interchange layout.

The firm of Richardson, Gordon and Associates has had a major role in engineering such impressive projects as the $50 million section of the Indiana Toll Road, involving the Gary-West Interchange near the Chicago city line; relocation studies of the $38 million Interstate project from the California line to Reno, Nevada, and design of a part of it; and $100 million worth of highway relocation and new expressway construction in the Pittsburgh area.

Mr. Richardson says that they enjoy designing with steel . . . it's a versatile working material, and they know exactly what its performance will be. More than 80% of their bridge designs employ steel throughout. Steel can be transported rapidly and in great quantities when long distances are involved. Since all projects are handled on a time schedule, this feature alone could mean the difference between profit and loss on a given job. Then, too, steel is not difficult to handle, when being transported or placed in a structure.

Increased facilities. Because of the vigorous, ever-expanding demand for steel structures, United States Steel has greatly expanded its facilities for the manufacture of structural shapes and plates. You can confidently design in steel—the material that offers most—knowing that steel will meet your needs and be available. *USS is a registered trademark*

Mr. George S. Richardson, Senior Partner of Richardson, Gordon and Associates and Mr. James H. Morehouse, Partner, examine scale model of Brady Street Interchange, Pittsburgh. In the background is photo of the Delaware River Turnpike Bridge which won Honorable Mention—Class I in the 1956 Annual Bridge Competition of the Institute of Steel Construction.

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The same performance holds true with the use of any one of the 10 *quickly-interchangeable* attachments that give the Speed Swing its outstanding *all-job versatility!*

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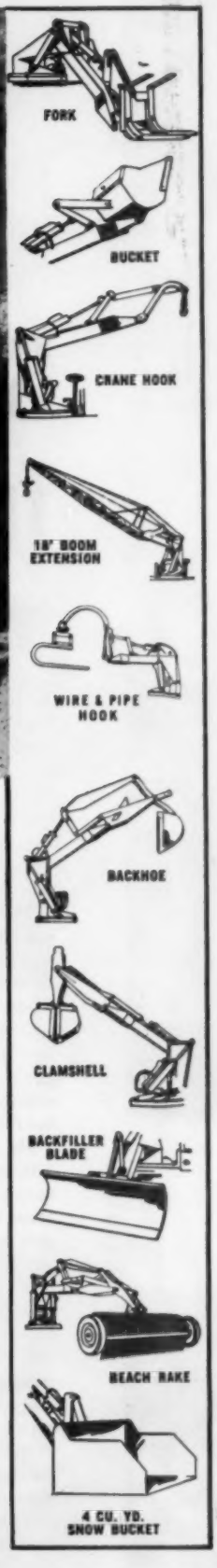
Get the whole picture with all the facts on the Speed Swing's *proved profit-making performance.* Write for complete information today!



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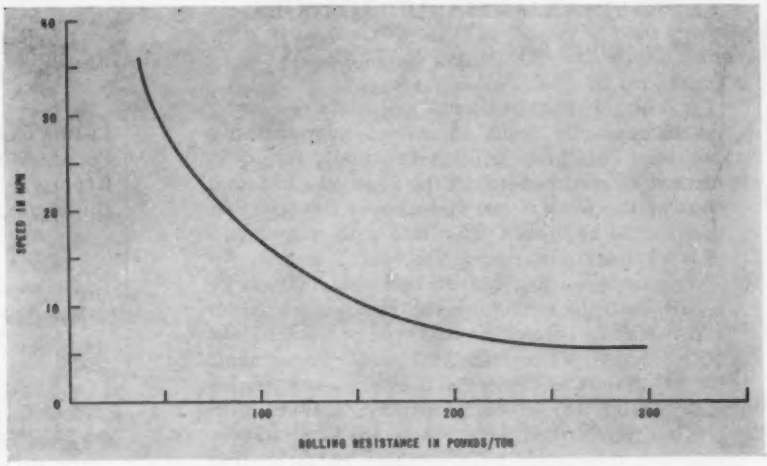
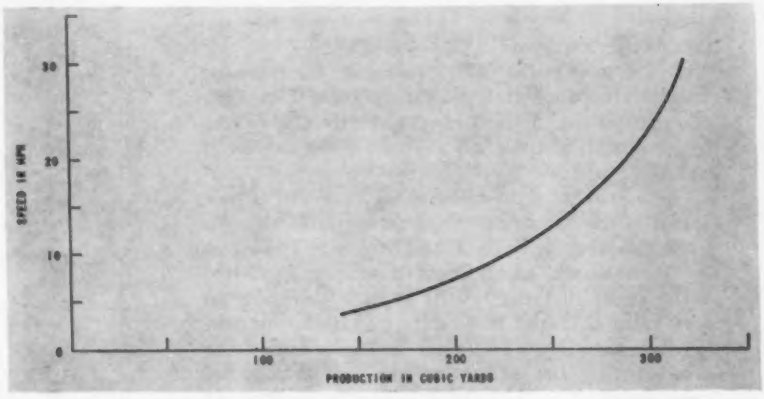


How haul speed drops quickly as the road becomes increasingly soft. Curve shows speeds attainable with Caterpillar DW20-456 combinations on level grade at various rolling resistances. (See your handbook!)



How speed of haul makes the contractor money. Curve shows how production rises sharply as haul speeds increase. The curves based on Cat DW20-456 unit.

GOOD HAUL ROADS

Continued from page 139

a crawl. Frequently production gains will warrant cutting through or building a new road around such hills. Travel time will be reduced, stresses on machinery lessened. An economical grade can be selected by knowledge of the job, and speed and gradeability computed from the manufacturer's tables.

Sharp curves in the haul road can cause as much interruption in travel as narrow passages and crossing traffic (even with flagmen for protection). Operators slow down for such areas, and time is lost in deceleration and acceleration. These bottlenecks may be profitably removed, or at least eased.

3. Good Traction. Good traction is a must, particularly when heavy machines must negotiate adverse grades. This problem is compounded by rains or running water. Ditches, crowning and culverts all can help keep dirt roads firm. A nonskid surface, such as gravel, may well be worth the expense to permit movement immediately after or during rains. All-weather roads may be worthwhile, if dampness doesn't affect the material being moved.

Choice of machines is directly affected by these conditions. Poor rolling resistance or steep grades will necessitate extra high horsepower. Transmissions and drive systems similarly must be matched to the terrain. Machines designed to cover all conditions must sacrifice simplicity and economy of operation. If the machines were to be operated only on good haul roads—with no steep grades, and with good traction and rolling resistance—they could be designed to provide maximum production at minimum cost. And with the machines now on the market, larger loads can be carried more swiftly when haul roads permit.

A Simple Rule. Agreed that good haul roads can prove to be money-savers, the question remains: How much can be spent to bring these roads up to desired standards? An approximation can be arrived at quickly and easily, using (1) a simple rule, (2) machine specifications, and (3) the bid price of the material being moved. For the sake of illustration, assume five 20-yard scrapers, 33-cent dirt, 1000-foot haul, and 12-20 mph speeds.

The rule is simple: cycle time = fixed time + variable time. Fixed time, including loading, dumping, acceleration and deceleration is about 3 minutes when operating in top gears. Variable time

Continued on page 227

EXPENSE ANALYSIS APPROACHES

Continued from page 57

4. The very human tendency of many roadbuilders to gradually revise their own administrative policies. This in turn often eventually results in marked differences between the assumed and actual costs of the work items, and also in the way that they should be broken down into their components of labor, materials and equipment.

As soon as such a change becomes apparent or occurs, both the estimating and accounting sections which may be affected by that type of work should be informed. They must then make adjustments for (a) handling present and future work of this nature, and (b) reconciling these changes with previously obtained data which was used in cost reports and estimating. Or in short, the estimating and accounting sections should do what the old Irish contractors defined as "knocking their heads together."

Timekeeper on Spot:

We are now at the point where the methods for actually recording and processing general expense information are to be considered. Here is where the practical analysis of a roadbuilder's general expenses begins.

The low man on the tall and mythical totem pole known as the "family tree" of a roadbuilder's costs is the timekeeper. It is a standing rule known as the "First Axiom" of all forms of statistical analysis, to the effect that the results of any study are no more valid than the basic data which was used in their preparation. Therefor, let us consider the accompanying list of duties for the position of Timekeeper taken from the Administrative Manual of "U. I. Roadbuilders, Inc."

This outline of the responsibilities of a Timekeeper is typical. As many readers of *Roads and Streets* realize, it does not represent all of the duties sometimes performed by a timekeeper. By the same token, on large jobs sometimes more than one timekeeper is required to handle just a part of the above-listed duties. But in either case, the timekeeper is the initial source of cost data.

Basically, the timekeeper has only two duties. The first of course is to keep a record of working hours for pay purposes. The other is to compile information for the profit and loss analysis of that job. The fact that there is an overlap of these two obligations places the two under the responsibility of a single person.

Fortunately, there is a growing realization by many roadbuilders of the importance of the timekeeper. More contractors are seeing that in order to get the most for the money from the timekeeping job it should be assigned to a man of intelligence and good character who is willing to *think* about what he is doing.

However, even with a good man as timekeeper, it is possible for the data compiled by the timekeeper to be at times inaccurate, misleading, inadequate or confusing. Furthermore, very little of the fault may lie with the timekeeper. This is because of the following trouble spots or potential hazards:

Outline of Timekeeper's Duties

"U. & I. ROADBUILDERS, INC.,"
Administrative Manual

Listing of Job Duties continued . . . .
Position: TIMEKEEPER
Reports to: (1) Accountant. (2) Project Manager.
Duties are as follows:

1. Keep current roster of all men and major equipment on project.
   - A. Alphabetical listing of all employees by . .
     1. Personnel file of name, address etc. trade and date hired. (Acctg. T-1)
     2. List of current work crew assignments
   - B. Record of all major equipment on job including time charges. Listed according to class of equipment.
2. Process Time Cards for men and equipment
   - A. Enter crew names or equipment numbers on blank time cards for foremen at start of week.
   - B. Verify (including an occasional spot check at jobsite) cards received from the foremen for the following:
     1. Work items
     2. Man-hours
        a. Be sure that all men are accounted for.
     3. Equipment-hours
        a. Company owned
        b. Leased
   - C. Submit to main office weekly payroll list of men and number of hours worked in each pay classification.
   - D. Handle paychecks
     1. Compare checks from main office with payroll
     2. Issue checks through foremen
     3. Prepare termination checks
3. Compile a daily record of labor and equipment (rental) expenses including a weekly summary on the first of the following week.
4. In the absence of more pressing duties, prepare graphs of work item completion versus labor and equipment hours as directed by the Project Manager.
5. As time permits, perform other duties under the direction of the Project Manager.

1. Inaccurate data.

(a) The foreman is not thoroughly familiar with the Schedule of Accounts. He assigns too much of his crew's time to the more important-looking work item numbers.

(b) The foreman keeps inadequate records, is consistently late in turning in his time cards, is himself inaccurate and frequently messy in his own records-keeping, and in short he is poor as at book-

keeping even if he has been with the company for a long time.

(c) The foreman knows that his crew is not doing a good job; he may be trying to cover up for either his own deficiencies or those of some of the men on his crew, by "spreading" time over to another job item.

From this it can be seen that these "hidden inaccuracies" are often the responsibilities of foremen who, themselves, may need further training in either their own line of work or what used to be called "character building."

2. Misleading data.

(a) *Both* timekeeper and foreman are confused or have different ideas about the meaning of some of the items in the Schedule of Accounts.

(b) The breakdown of a particular work item may be too broad. Consequently, it either overlaps some other work item or should be broken into two or more items.

(c) The foreman is "fuzzy" about exactly how the men did spend their time; therefor, the timekeeper's "interpretation" may not always be correct. The prime cause of misleading data is often misleading work items. Such misunderstandings should be clarified as soon as possible *in writing.*

3. Inadequate data.

Such data can, of course, result from the loss of records. The most common cause however is that the timekeeper was not told the exact nature of the information he was supposed to obtain. Furthermore, it is often good practice to furnish the timekeeper with an actual set of forms to be filled out whenever he is requested to obtain additional or more specific data.

4. Confusing data.

As a general rule, confusing data is the result of situations akin to the old saying of "Ask me a confusing question and I'll give you a confusing answer."

In winding up this brief discussion of timekeepers, it must also be stated that essentially the timekeeper's job is one of preparing records. The timekeeper may be doing his job well and within the specified 8 hours of work, but this is not a valid reason for "rewarding" him with a number of unrelated duties which might more logically be handled by someone else or else just plain forgotten.

Timekeepers are often in an excellent position to observe the flow of expenses. When trained to understand the nature of differences in these expenses, timekeepers often make excellent reporters, not only of cost data but of the underlying causes of increases and decreases in costs.

On most construction jobs, after the timekeeping data have been compiled, the records are sent in to the main office. However, it has been found in the case of large, and often isolated projects, to sometimes handle most of the accounting functions in the field. The first of these systems is known as "centralized" accounting; the latter is spoken of as "de-centralized" accounting. There are certain advantages in using one or the other of these two techniques according to the actual circumstances affecting a given job.

However, with continuing improvements in mechanical and electronic processing of data, it is likely that more instead of less of the basic accounting operations of journal entries, ledger maintenance and summary reports will be performed at the central accounting point.

The forthcoming article will discuss timekeeping and accounting forms, and the means for broadening the services of the Accountant to the Roadbuilder.

Kelly Heads Concrete Institute for 1960

Joe W. Kelly, professor of civil engineering, University of California, was elected president of the American Concrete Institute at its 56th annual convention, held March 14-17 in New York City.

Other ACI officers for 1960 include Raymond C. Reese as vice president, and A. Allan Bates, Bruce E. Foster, Ben C. Gerwick, Jr., and James A. McCarthy as members of the Board of Direction.

Mr. Kelly has served on the ACI board and on technical and administrative committees. He is currently a member of the Standards committee and ACI committee 611, inspection of concrete. The well-known ACI Manual of Concrete Inspection was produced during his committee leadership, and Professor Kelly is known from many other technical papers and articles on a wide range of subjects. He was awarded the Wason Medal in 1934, among many others.

The ACI at its New York convention elected its 30th and 31st honorary members. One is Prof. Charles H. Scholer, consultant and former head of the department of applied mechanics, Kansas State College, and a past president of ACI. The other is William Lerch, recently retired as assistant to the vice president for Research and Development, Portland Cement Association, Chicago.

Eleven engineers received the 1959 American Concrete Institute awards, presented at the convention. These include the Turner award, given to Harrison F. Gonnerman, Oak Park, Illinois, consulting engineer and for many years on the Research and Development staff of the Portland Cement Association; the Lindau Bronze Plaque to Arthur R. Lord, Palos Park, Illinois; the Kennedy Scroll to Harry C. Delzell, managing director, Concrete Reinforcing Steel Institute, Chicago; the Wason Medal for Research, to Boris Bresler and K. S. Pister, University of California; the Wason Medal for Most Meritorious Paper, shared by James E. Backstrom, Richard W. Burrows, Harry L. Flack, Richard C. Mielenz, and Vladimir E. Wolkodoff; and the Construction Practice award, given to J. F. Camellerie.

A MEASURE INTRODUCED in the Rhode Island legislature would provide for a statewide referendum on a state quaranty at 20 million of a proposed 36 million revenue bond issue by the Rhode Island Turnpike and Bridge Authority to finance construction of a toll bridge between Jamestown and Newport.

OKLAHOMA PROJECT I-205 (5) Interstate Route 40

Oklahoma builds to last...with "DEEP-STRENGTH" Asphalt pavement

• Hot-mixed—hot-laid Asphalt base promises outstanding service life.
• Design overcomes problems of plastic subsoil and short aggregate supply.

Down in Oklahoma, they've just completed a beauty . . . a new *Deep-Strength* Asphalt pavement that includes many features of The Asphalt Institute's Advanced Design Criteria.

And it won't be the last. That's for sure.

Just take a look at the construction (right) and cross section (below). Notice that precepts of new *Deep-Strength* Asphalt design are incorporated...heavy-duty Asphalt concrete surface course . . . heavy-duty Asphalt base . . . Asphalt primed subbase . . . wide double-sealed Asphalt shoulders (on Asphalt base) . . . heavy compaction . . . good drainage.

When designed like this — for *Deep-Strength* . . . Asphalt pavements will carry the heaviest traffic loads without distress . . . with minimum maintenance cost. Witness the New Jersey Turnpike. Witness also *Deep-Strength* Asphalt city pavements built more than 60 years ago and still in service.

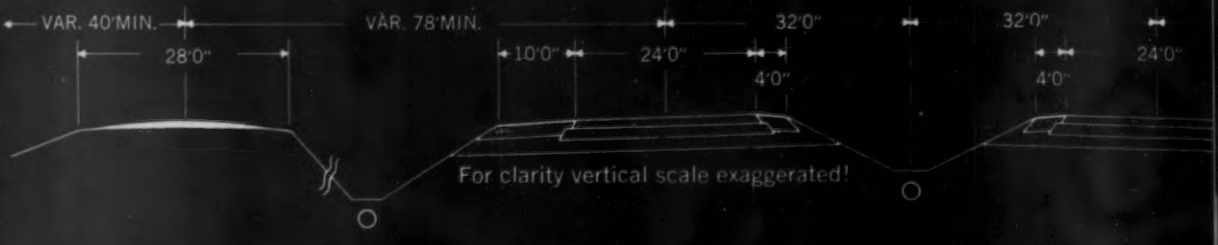
Save money, too

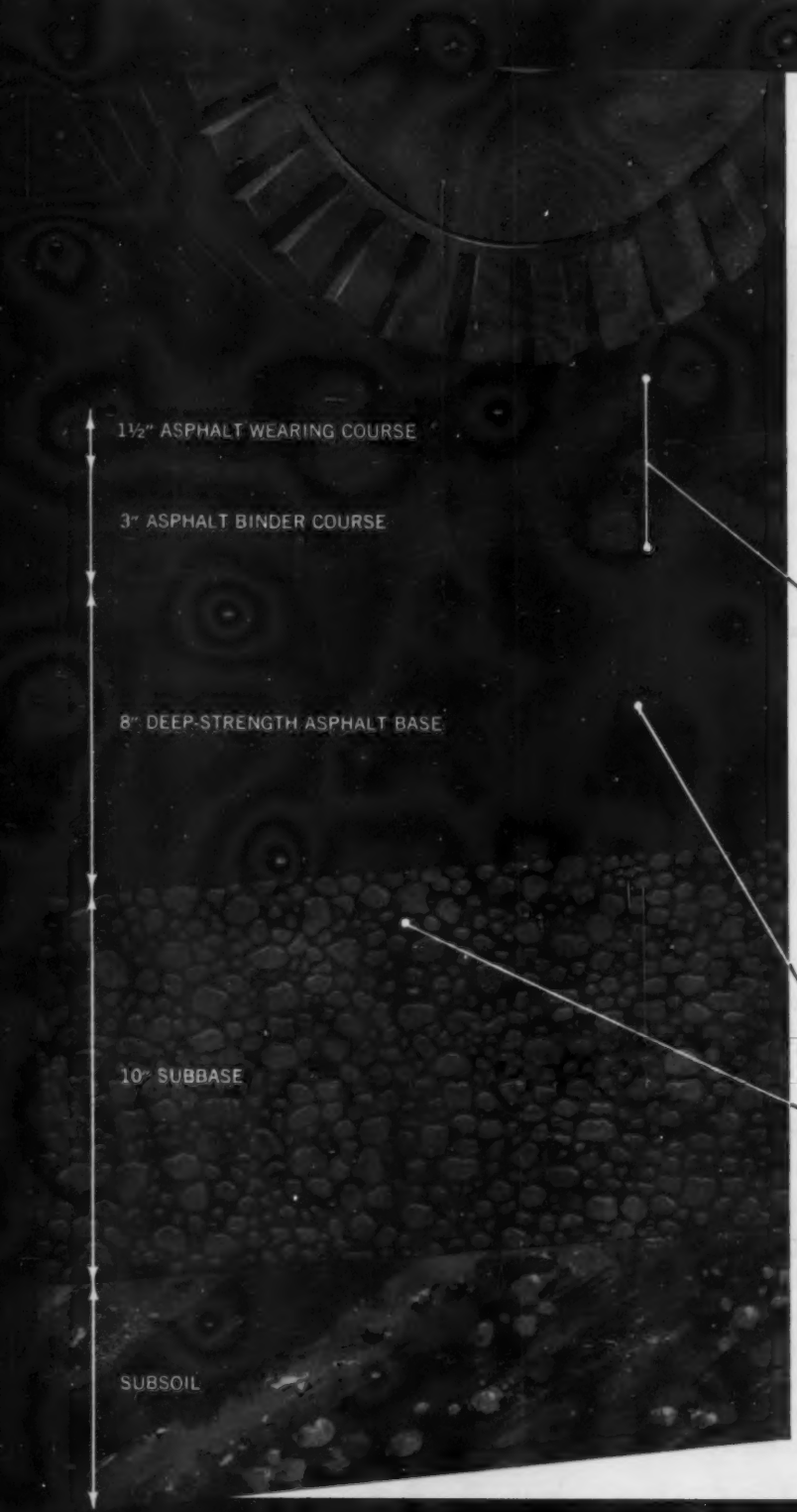
Surprising as it seems at first glance, modern low-maintenance, *Deep-Strength* Asphalt pavements often cost less to build than Asphalt pavements designed to other standards. That's because the Advanced Design Criteria permit inexpensive Asphalt base to be substituted, within limits, for the more expensive Asphalt concrete surfacing. And also because total pavement thickness can often be reduced by several inches.

New Handbook

Now on the presses is a new edition of The Asphalt Handbook. It incorporates all the Advanced Design Criteria for highways implied by the term *Deep-Strength* Asphalt Construction. Copies soon will be available at The Asphalt Institute office serving your area.

DEPRESSED MEDIANS ASSIST FREE DRAINING. Note also the Asphalt shoulder construction. These two measures alone can substantially





4½-INCH ASPHALT CONCRETE SURFACE takes heaviest traffic, deicing salts without distress. Lane markings show up better day or night, wet or dry.

8-INCH SAND-ASPHALT BASE provides Deep-Strength . . . excludes moisture, insures smoother riding surface under heaviest traffic.

ASPHALT PRIME COAT SEALS SUBBASE . . . insures bond with overlying Asphalt base.

lengthen pavement life.

Ribbons of velvet smoothness . . . ASPHALT paved Interstate Highways

DEEP-STRENGTH

THE ASPHALT INSTITUTE

Asphalt Institute Building, College Park, Maryland

28 "EUCS"

BUILDING 11 MILLION YD. EARTH-FILL DAM

30 YD. BOTTOM-DUMPS ON LONG, HIGH SPEED GRAVEL HAUL...REAR DUMPS HANDLE BIG ROCK LOADS

Hills Creek Dam in western Oregon is part of the Willamette Valley Project under construction by the Corps of Engineers to provide flood control, navigation, power and irrigation. The embankment will require 11 million yards of earth and gravel fill and is scheduled for completion in 1961... it will be 2,400 feet in length and will have a maximum width of 1,600 feet at the base and 24 feet at the crest.

Green-Tecon, a joint venture of Green Construction Co., Des Moines, Iowa, and the Tecon Corporation of Dallas, Texas, have the earthmoving contract. These contractors are using a fleet of 28 Euclids on this big job . . . 13 Bottom-Dumps of 30 yd. and 7 of 17 yd. struck capacities and 8 Rear-Dumps of 22 and 27-ton capacities. The big "Eucs" work two ten-hour shifts six days a week... have marked up an excellent record of productive capacity and job availability.

Whether your operations involve big earthmoving projects like this one or small grading, stripping and industrial work, there's a Euclid model to match your requirements. Get all the facts and figures on the modern Euclid line of crawler tractors, scrapers, rear-dump and bottom-dump haulers from your Euclid dealer.

Six 27-ton and two 22-ton Rear-Dump "Eucs" haul rock from the quarry to the fill... all of these units are equipped with Torqmatic Drives and Torqmatic Brakes.

EUCLID Division of General Motors
Cleveland 17, Ohio

EUCLID (GREAT BRITAIN) LTD.
Lanarkshire, Scotland

A 7½ yd. dragline loads a Model LDT Bottom-Dump Euclid with 40 yds. of river gravel for 2½ mile haul to the fill. Green-Tecon have 13 of these big "Eucs" that are powered by 12 cylinder GM diesel engines of 432 h.p. with Torqmatic Drive.

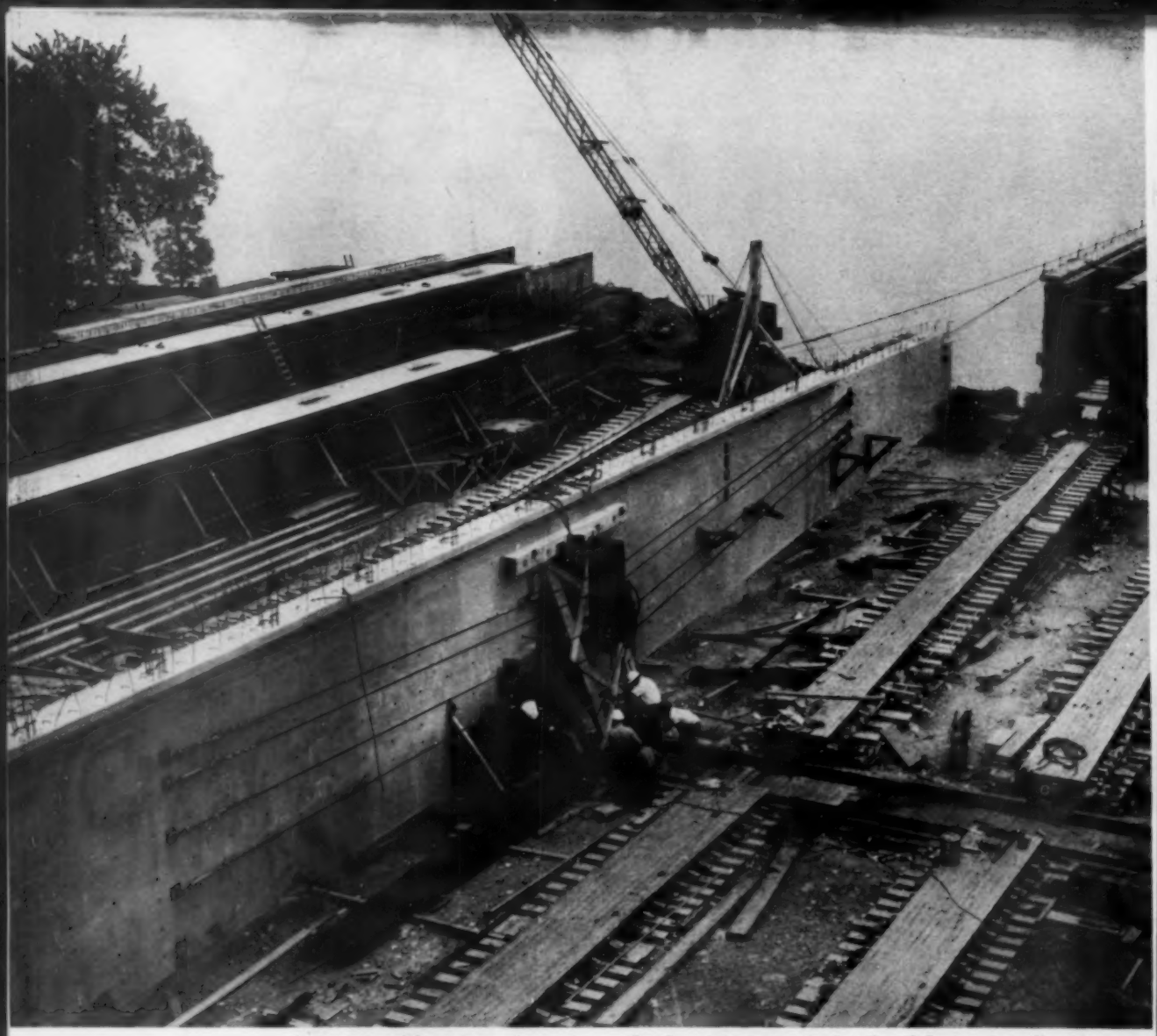
Big loads of heavy gravel move over good haul roads at fast travel speed in these Bottom-Dump "Eucs". Torqmatic Drive — torque converter and semi-automatic transmission — provides full-power shift and a smooth flow of power to meet all road and grade conditions on the 5 mile cycle.

Well-maintained haul roads enable the Rear-Dumps to utilize their fast travel speeds on the 4500 ft. rock haul. On downgrades that are a maximum of 15% Torqmatic Brakes provide positive control of speed.

GM GENERAL MOTORS EUCLID

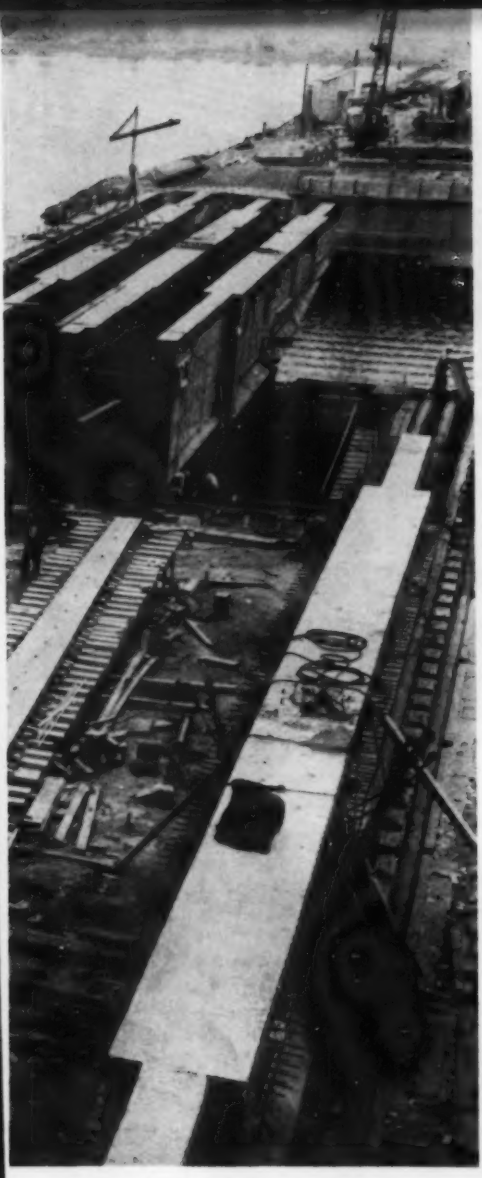
EUCLID EQUIPMENT

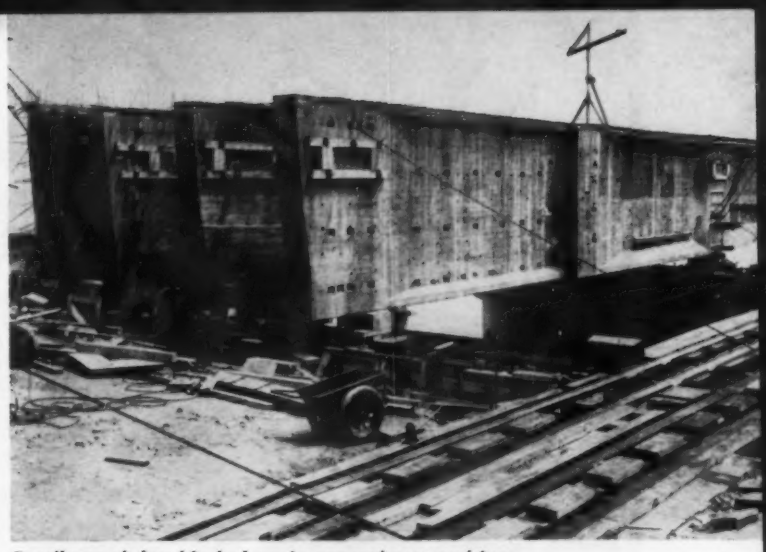
FOR MOVING EARTH, ROCK, COAL AND ORE



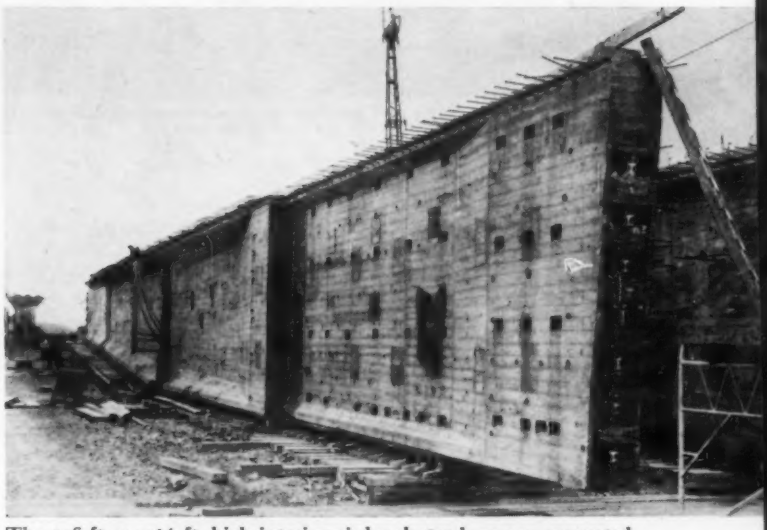
At extreme right, preparations are completed to move a 240-ton interior girder out over the water, alongside the four positioned ones. Later, the exterior girder at the left center was positioned, completing the six cantilever girders for one bridge on this side.

Biggest Prestressed Concrete Bridge Nears Completion





Cantilever girders blocked up in approximate position.



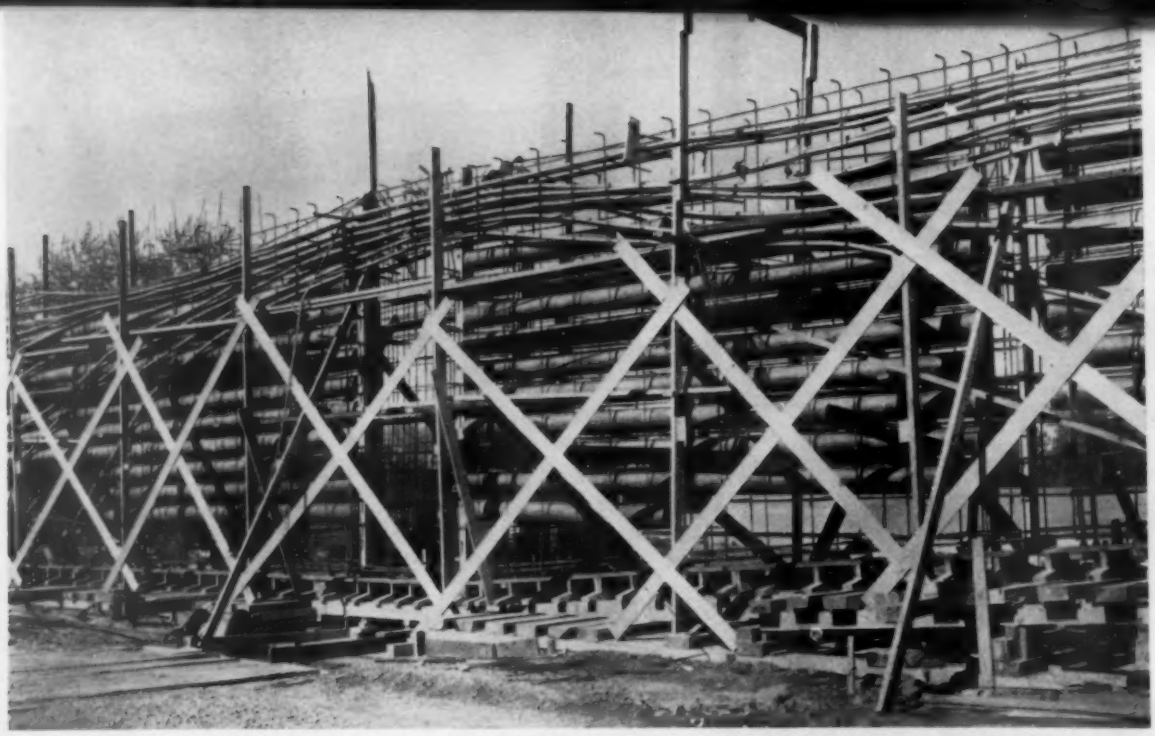
The 146 ft. x 13½ ft. high interior girder shown here was concreted in 5½ hours—half the time that it took to cast the first girder in May, 1959.

A milestone in prestressed concrete construc- is the $1,968,000 Oneida Lake Bridge, nearing completion in upstate New York. Forming a link in Interstate Route 505 between Binghamton and the Canadian border, the structure has many noteworthy features. With its 320 ft. center span and flanking 70 ft. spans it will be one of the longest prestressed concrete structures in the world, and is the longest such bridge in the U. S. Terry Contracting, Inc., Long Island City, New York, has the contract.

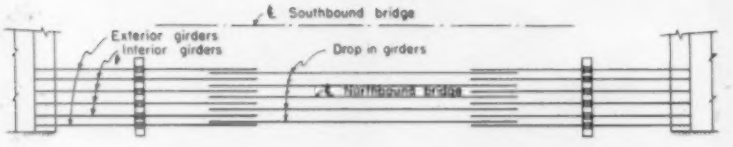
The bridge comprises two parallel structures each carrying a 3-lane roadway of the dual freeway. Each structure is made up of twelve 146-ft. cantilever girders which carry five 231-ft. "drop-in" girders hung between them. Under live load this becomes a three-span continuous structure with continuity achieved by post-tensioning transversely at ends of cantilever. All members are post-tensioned concrete monoliths. As might be expected, their successful construction called for many engineering and construction "firsts," developed jointly by the owner, consulting engineer and the contractor.

Before the first girder was cast in May, 1959, the contractor spent a full year in work-planning, engineering and resolving problems dealing with actual concreting and handling operations.

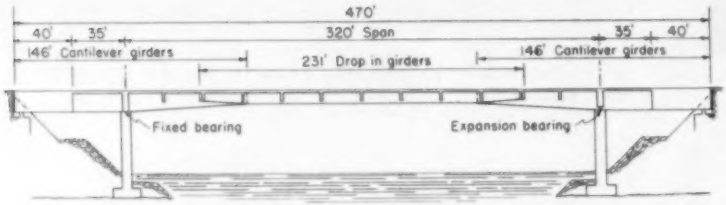
Five sets of forms were prefabricated in Syracuse, N. Y., during the winter of 1958, these consisted



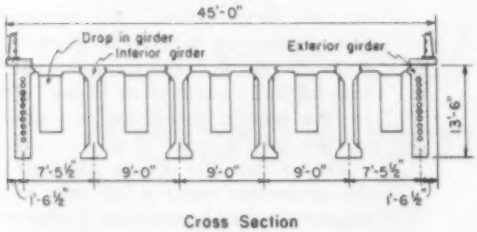
Exterior Sonovoid tubes and tendons were positioned in the web before the prefabricated forms were placed.



Plan



Longitudinal Section



Cross Section

Showing the novel scheme of cantilevered parallel girders, supporting suspended girders in an "alternate" position, the latter placed by the "drop-in' 'method.

of one set for the exterior girders involving Sonovoid tubes (in 14 parts); two sets for the interior cantilevering girders (in 28 parts); two sets for the drop-in girders (in 44 parts). Forms were designed for rapid re-use, each set costing over $10,000. With high-early strength concrete, it was possible to cast a new girder every 14½ days with each form.

It usually took three days to position the forms and to "make ready" for casting, four days for placing the tendons and reinforcing steel, one day to cast the girders, four days for the concrete to reach specification strength, one day for tensioning eight tendons, and 1½ days to move the girder out over the water.

The casting beds were designed so that the 240-ton cantilever girders could be moved across them with ease, out over the abutment and pier.

There are 20 tendons in the exterior cantilever girders and 28 in the interior ones. Before moving the girders, eight of the tendons were tensioned in each. Later, they were grouted from one end, using a mix consisting of three parts cement and one part fly ash

Continued on page 155

400,000 miles without failure on their first LaCrosse Trailer–

Matson, Inc. owns 11 now

Matson, Inc. has traveled 400,000 miles with the above LaCrosse Lowbed, hauling such loads as this 25-ton scraper. Never a failure since the trailer was put in service in 1954.

This huge quarry truck was hauled from near Boston, Mass. to Iowa City, Ia. on a LaCrosse Lowbed. Annually, Matson's 11 LaCrosse trailers each average 80,000 miles.

Loren Baker, Superintendent
MATSON, INCORPORATED

Rarely does a trailer manufacturer have the opportunity to dramatize product quality—yet, the very factor that permits LaCrosse owners like Matson, Inc. to establish such outstanding performance records as the following—stems from such quality . . .

Loren Baker, superintendent of this Cedar Rapids hauling firm, says: "We bought our first LaCrosse lowbed trailer in 1954. It has seen over 400,000 miles service and we've never put a weld on it.

"We're racking up more than 800,000 miles per year on our *11* LaCrosse trailers, hauling power shovels, scrapers, tractors and rock crushing equipment into 39 states. Haven't had a failure on any yet.

"Besides, the gooseneck is low, so that a big scraper can be easily hauled in conformance with the 13′ 6″ clearance regulation in most states.

"Big tail lights, smooth hauling characteristics are other features we like."

Matson purchased 5 LaCrosse Trailers in 1959 . . . kind of like betting on the winning horse.

Facts like these show why LaCrosse Trailer sales zoomed 40% in 1959. Each is backed by a full one-year warranty in writing. Here's how to get complete information.

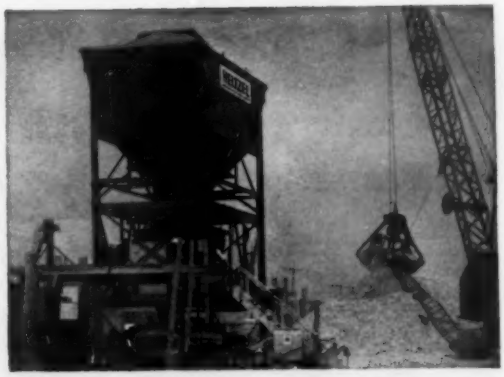
LaCROSSE

LEADERS IN LOWBEDS

LaCROSSE TRAILER CORPORATION

418 Gould Street • La Crosse, Wisconsin

. . . for more details circle 344 on enclosed return postal card



Heltzel 150 ton, 3 compartment, unitized type 200 aggregate bin. Three, 50 ton compartments. Twin, 1½ yard automatic batchers.

In South Carolina, too . . .

the move is to Heltzel's unitized, portable batch plants

Heltzel E-3, 357-390 barrel, unitized portable cement batching plant. Automatic twin batchers. 671-742 bbl. single compartment, portable cement tank.

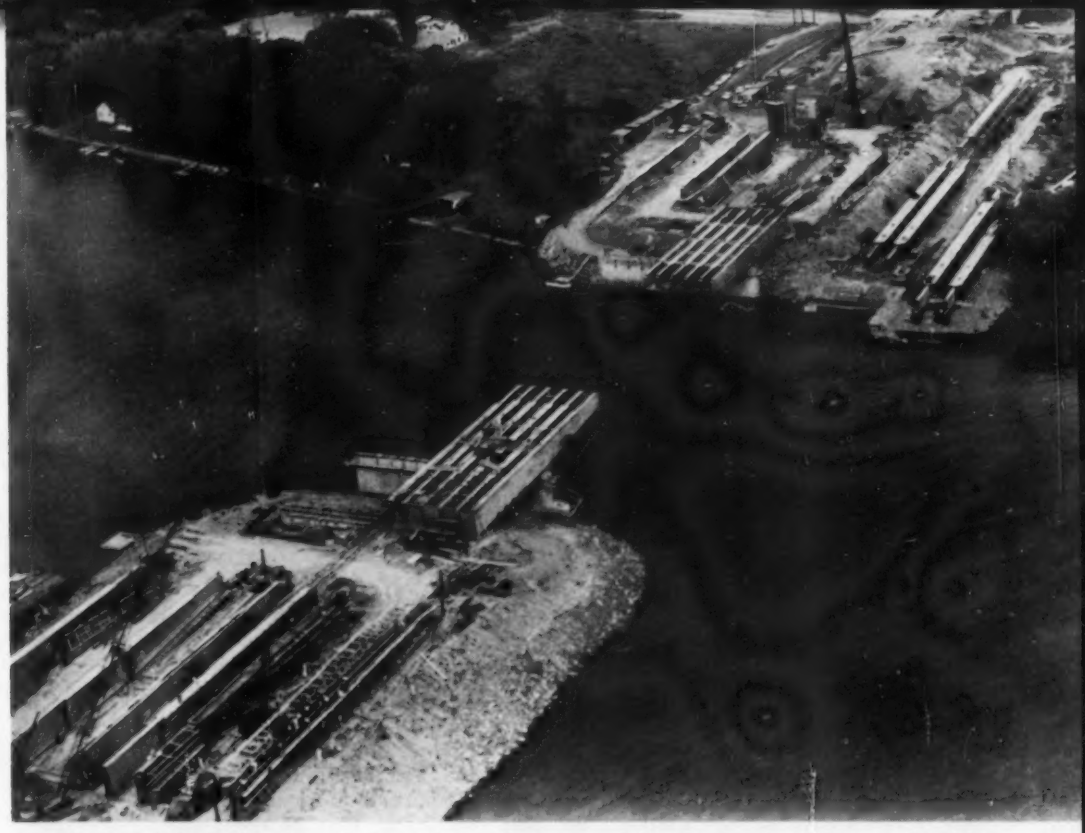
Contractors across the country are taking advantage of Heltzel's easy to set-up and dismantle, fast, accurate batch plants . . . designed to fit each specific requirement.

Simplified design includes easy-to-handle sections that require only a minimum crew and standard crane equipment to set-up in record time. Factory assembled elevators, batcher and bin sections, may be shipped as complete "package" units—easily set in place—accurate—fast-operating and rugged.

It will pay you to investigate Heltzel Batch Plants for maximum versatility and cost-reducing operation. Write for free data containing complete details.

HELTZEL STEEL FORM AND IRON CO.
WARREN, OHIO

. . . for more details circle 330 on enclosed return postal card



A good view of the bridge site and the casting yards—note yard for the drop-in girders, at the right.

BIGGEST PRESTRESSED CONCRETE BRIDGE

Continued from page 152

with 1 lb. of Intraplast B for every 2 cu. ft. of grout. (The Intraplast was to make the mortar cohesive, and afforded expansion to assure full encasement of the 0.25 in. dia. wires). Wires range in number from 24 to 28, in each 2⅛-in. flexible conduit.

The general arrangement of the tendons in the cantilever girders is low at the ends and spaced along the bottom flange for starting and finishing points, gradually curving to the top at the centerline at the main supporting point. The tendons in the drop-in girders form a parabolic curve, starting at the center of each end and with the low point at the girder's mid-section.

Stressing of the wires was done 4 to 12 days after the concrete was poured. The wires in each tendon were stressed simultaneously by means of a portable hydraulic jack capable of developing a force of 200 tons. Anchoring devices hold the stretched wires in place. The space around the wires was filled with grout, forced in under 150 psi pressure.

Part of the counterweight and some of the diaphragms were cast and then the second stage of tensioning carried out.

After partial post-tensioning in the yard, the girders were raised up on jacks at two points along their length and moved transversely on German express rollers, to a position where they could be moved out over the abutment and pier which was connected by a temporary steel bridge. The cantilever was then supported on sand jacks while workmen placed the shoes and rockers.

Girders while being moved were buyed with 1 in. steel cables to prevent tipping, as the heat from the sun caused the girder ends to bend as much as 2 in.

Completed drop-in girders were moved out onto a 40 x 200 ft. car float, positioned and lifted into place. Transverse tensioning then tied together the entire system which had been partially counterweighted.

Diaphragms transversely tensioned with tendons contain fourteen 0.25-in. wires. The final stage of tensioning took place after the drop-in girders had been lifted into place and then the remainder of the concrete counterweight was installed.

Concrete was furnished from an automatic batching plant which had a Howe scale and Batchmaster equipment. Two 1-yd. Worthington mixers rated at 40 cu. yd. per hour were used to turn out a 5-in. slump mix.

Three casting yards were used for the girders. The cantilevers were cast on either shore, to the rear of the abutments, (see airphoto). The drop-in girders were cast on the east side of the north bank. Concrete was delivered to the point of placement by transit-mix trucks. A unique technique of placing the concrete utilized 14 towers which supported hoppers, to which elephant trunks were attached, feeding into openings in each girder's sides. One crane using

Continued on page 225

TRENCHING 12 LANES

Continued from page 128

any rigid pouring schedule—it's been a "fast-as-you-can job," with maximum pours about 300 cu. yd. per day. All wall sections between prescribed construction joints are required to be monolithic, with no cold joints. Enough truck mixers must be always on hand to insure continuous concrete delivery at the rate required for proper handling, placing and finishing, usually 30 to 40 cu. yd. per hour.

Concrete usually has been deposited simultaneously at four locations to meet the specification. The requirement: that exposed concrete be deposited in 1-ft. layers at a continuous rate of rise of 3 ft. per hour when the ambient temperature exceeded 80 deg. F. Two internal-type vibrators have proved adequate to secure consolidation and prevent honeycombing. The rate of pour actually is controlled so as not to exceed a 4 ft. liquid head at any time. Forms are left in place 7 days as an aid in obtaining proper curing. All forms are insulated with one inch of insulation so that concreting can be accomplished even in freezing weather.

Locating Utilities. The philosophy in locating and preserving seven or more kinds of existing utilities seemed to be: "It's going to take time and cost money, so take it easy." Brookfield's policy is to notify the interested agency that its utility is about to be involved in construction work. The agency sends a representative to observe the operation (and shut off the service if feasible). Such observers remain on the job as long as needed to be of service.

Existing utility maps were found "reasonably good"; most utilities could be located within 3-4 feet. However, almost none are tied accurately to any baseline or coordinates. The contractor has worked largely from manholes and valves to chart tentative locations, and test holes are often carefully excavated during the uncovering, to locate points on the line.

Excavating around utilities has required slow and careful handling. Where blasting is necessary, closely spaced line-drilling and light loading are in order. Most excavation for utilities has involved hand labor and small tools. Utility excavation set up in the schedules was bid at $12 per cu. yd. One item of maintaining 300 lin. ft. of 30-in. gas main was bid at $20 per ft., to give a further example of the necessarily high price scales.

Acknowledgements. For Brookfield; John Sorensen is general superintendent, Arthur Shaw project engineer, Henry Hadenfeldt carpenter foreman, and Alex Walker master mechanic. For the Port of New York Authority, Harry Druding is senior resident engineer, George Husing and Stan Forman resident engineers for the New York side.

PREQUALIFIED CONTRACTORS

Continued from page 121

gineer of construction in the department: "Some contractors who were on the 'fringe line' in qualifying under any plan have fallen by the wayside in increasing numbers the past two years. Part of the reason for this perhaps is the tighter money policies, which factor alone has tended to eliminate some lesser qualified or over-extended firms."

What "Prequalified" Means?

The meaning of prequalification as applied to highway contractors is generally the same among the states. A. E. Johnson, executive secretary of American Association of State Highway Officials, told *Roads and Streets:*

"We do not have an official definition of the word 'prequalification' as it refers to highway contractors. However, I believe that all of the states that practice prequalification actually have the same definition in effect. It means that they predetermine *ahead of* an issuance of a proposal that the contractor is qualified financially, by experience, in supervisory personnel, and in equipment, to perform the work if he is the successful bidder."

States which do not demand prequalification have other means of guaranteeing to their satisfaction the capabilities of bidding firms. In Minnesota, for example, the specifications for proposed state highway work include the following:

"Each bidder, upon the request of the State, will furnish in writing a statement showing the experience of the bidder, the amount of capital and equipment he has available for the performance of the proposed work."

This statement is requested in Minnesota from the low bidders on proposed work whose performance is unknown to the highway department, and it is evaluated before the award is made.

Thus in this and in most of the other non-prequalifying states, satisfactory past performance on state highway contracts is generally considered to eliminate the need for formal prequalification.

There does exist some sentiment toward prequalification in those states where this requirement is not applicable today. In Pennsylvania, the department of highways has made a proposal to incorporate prequalification into its specification. An "if" has arisen, however. If not substantiated by appropriate legislation, this prequalification would not be agreed to by all parties concerned.

Michigan Has New Bid Opening Setup

Due to the large number of projects being advertised for bids and the large number of bids being submitted on each project, the state highway department has announced a change in its procedure at bid opening time.

All proposals submitted will now be opened and read without any decision being made as to the sufficiency of the proposal.

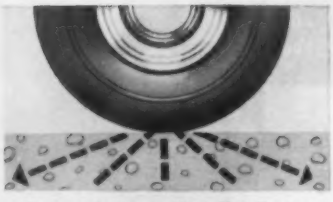
The reading of a bid will not be construed as the acceptance of the proposal by the highway department. Final acceptance or rejection of a proposal and the determination of the low bid will be made after the I. B. M. summary and after review by a special committee of department personnel.

DURING 1959 A RECORD breaking 70.4 million motor vehicles traveled nearly 700 billion miles. This "vital statistic" contained in "Automobile Facts & Figures" published by the Automobile Manufacturers Association, is one of the basic reasons for the urgency in keeping the National Road Program on schedule.

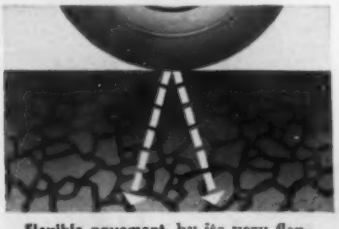
Modern concrete for Kentucky's Interstate 65 south of Elizabethtown

CONCRETE is the pavement that is not flexible

. . . gives maximum strength with minimum thickness!



Concrete's beam effect distributes wheel weight over large area of subgrade, reduces spot pressures. Strength of material—not mass—carries the load, permitting minimum-thickness pavement.



Flexible pavement, by its very flexing effect, transmits load forces in almost direct line to subgrade. Excessive concentration of load force can be overcome only by building up pavement thickness.

Interstate System highways like Kentucky's Route 65 pictured here call for a pavement that is solid and unyielding.

Kentucky's highway department chose concrete for this important stretch of Interstate System highway. Necessity for multiple strata construction of 2 to 3 times greater total depth was avoided.

Strength with minimum bulk is possible, of course, because concrete isn't flexible. It supports and spreads the load like a beam. Pressures on the subgrade stay permanently within safe limits.

And concrete's design efficiency assures low maintenance costs in years ahead. In fact, maintenance costs will be as much as 60% lower than for asphalt. Only concrete enables engineers to design highways to last 50 years and more.

You can see why engineers and taxpayers agree that concrete is the preferred pavement for heavy-duty highways—especially on the new Interstate System.

PORTLAND CEMENT ASSOCIATION

A national organization to improve and extend the uses of concrete

More proof that...

AMSCO HELPS YOU MOVE MORE TONS PER DOLLAR

How AMSCO screen parts and Simplex 2-Part Dipper Teeth are giving users greatly improved service life*

AT A LARGE NEW ENGLAND QUARRY

AMSCO CHUTE PLATES LAST 5 YEARS VS. 4 WEEKS FOR PREVIOUS TYPE

In the screen house of this quarry, two Amsco HC-250 abrasion-resistant chute plates are used on each Hi-G discharge screen. 500 tons per hour pass over each plate, during the two-shift, 20-hour operating day.

This installation resulted from a previous test, in which a set of Amsco plates was compared with regular carbon steel plates. The Amsco Chute Plates *lasted about 5 years*, whereas the competitive plates had to be replaced every 4 weeks.

The quarry operator reports that the Amsco plates presently installed are holding up excellently in service. Their exceptionally long life and trouble-free service means big dollar savings—through elimination of costly shutdown time.

ON THE NIAGARA POWER PROJECT

AMSCO SIMPLEX 2-PART TEETH DIG 40,000 YARDS OF ROCK BEFORE REPLACEMENT

At the right, you see the type of rugged rock excavation in which this outstanding service record was set. It's part of the Niagara Power Project—Conduit #2 South—being handled by Gull & Defelice Construction Company.

All dippers on the job are equipped with Amsco Simplex 2-Part Reversible Teeth. They operate 16 hours a day, 6 days a week—*handle approximately 40,000 yards of rock*—before tooth replacement is required.

In addition to their exceptionally long wear, the fact that Simplex Teeth *can be replaced in ten minutes with no trouble* is an important advantage to the operators. It all adds up to big savings—in replacement cost and shovel downtime.

*Patent No. 2,904,908

Wherever high impact and abrasion are problems, you'll "move more tons per dollar" with Amsco Dippers, Dipper Teeth and Crusher Parts. See your equipment dealer, or write us direct for technical bulletins.

AMSCO

AMERICAN Brake Shoe COMPANY

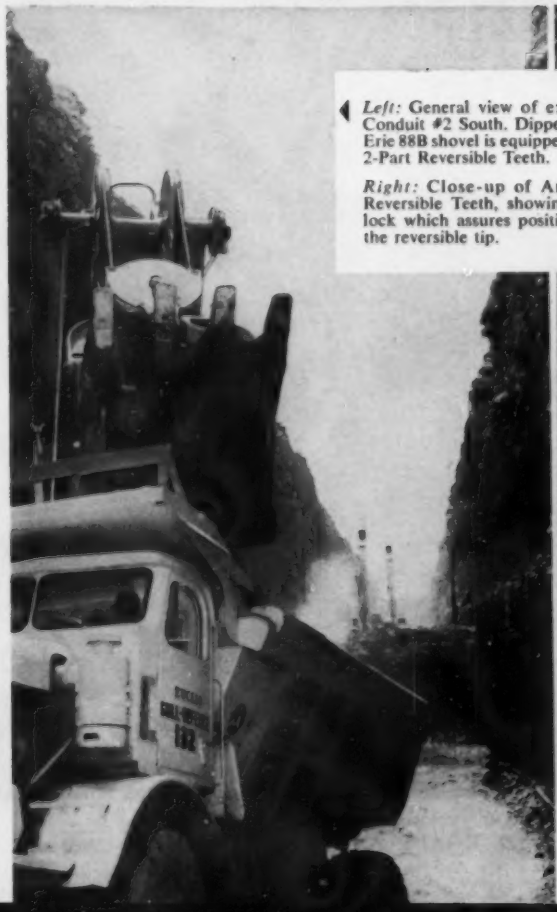
American Manganese Steel Division • Chicago Heights, Ill.

Other plants in: Denver • Los Angeles • New Castle, Dela. • Oakland, California • St. Louis
In Canada: Joliette Steel and Manitoba Steel Foundry Divisions

. . . for more details circle 277 on enclosed return postal card

Left: Close-up of Amsco Chute Plates used on each discharge Hi-G screen.

Right: General view of Hi-G screen in screen house of large New England quarry.



Left: General view of excavation at Conduit #2 South. Dipper on Bucyrus Erie 88B shovel is equipped with Amsco 2-Part Reversible Teeth.

Right: Close-up of Amsco 2-Part Reversible Teeth, showing special pin lock which assures positive locking of the reversible tip.

"We carry up to 2,500 lb. more FORD Tandems and still outrun

SAYS HARRY R. KUNZ
PRESIDENT, KUNZ PAVING CO.
SAN MATEO, CALIFORNIA

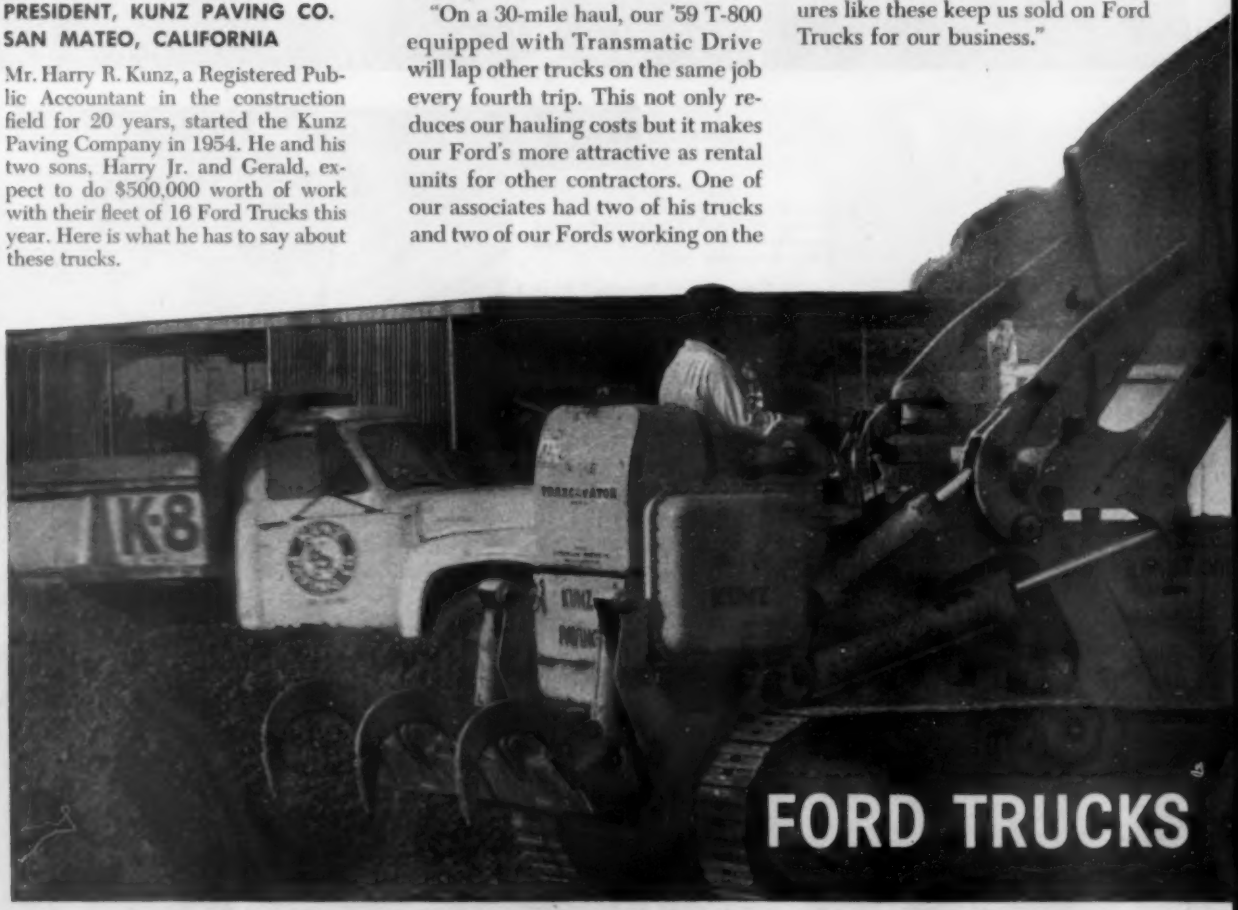
Mr. Harry R. Kunz, a Registered Public Accountant in the construction field for 20 years, started the Kunz Paving Company in 1954. He and his two sons, Harry Jr. and Gerald, expect to do $500,000 worth of work with their fleet of 16 Ford Trucks this year. Here is what he has to say about these trucks.

"Our experience with Fords has proved them to be the best all-around truck we can buy! They haul more payload, cut down considerably on trip time and cost less to operate and maintain.

"The lighter chassis weight of the Ford Tandems lets us carry as much as 2,500 pounds more than competitive makes. This extra payload means that we can haul as much in ten trips as the others do in eleven. Our Fords will beat them on a trip-for-trip basis, too!

"On a 30-mile haul, our '59 T-800 equipped with Transmatic Drive will lap other trucks on the same job every fourth trip. This not only reduces our hauling costs but it makes our Ford's more attractive as rental units for other contractors. One of our associates had two of his trucks and two of our Fords working on the same job. He actually paid for the rental of our trucks by the extra trips they made.

"Our cost records, set up on an hourly basis to make it easier to prepare bids, show that the longer life built into Ford Trucks makes them less costly to operate. We have one '56 Ford T-750 with over 100,000 miles on it that we use as a base for our tandem hauling costs. In spite of its high mileage – gas, oil, tires, maintenance and repairs amount to only $2.08 per hour. Facts and figures like these keep us sold on Ford Trucks for our business."



payload on our other trucks on the same job!"

Again in '60... FORD PICKUPS beat all leading makes in Gasoline Economy!

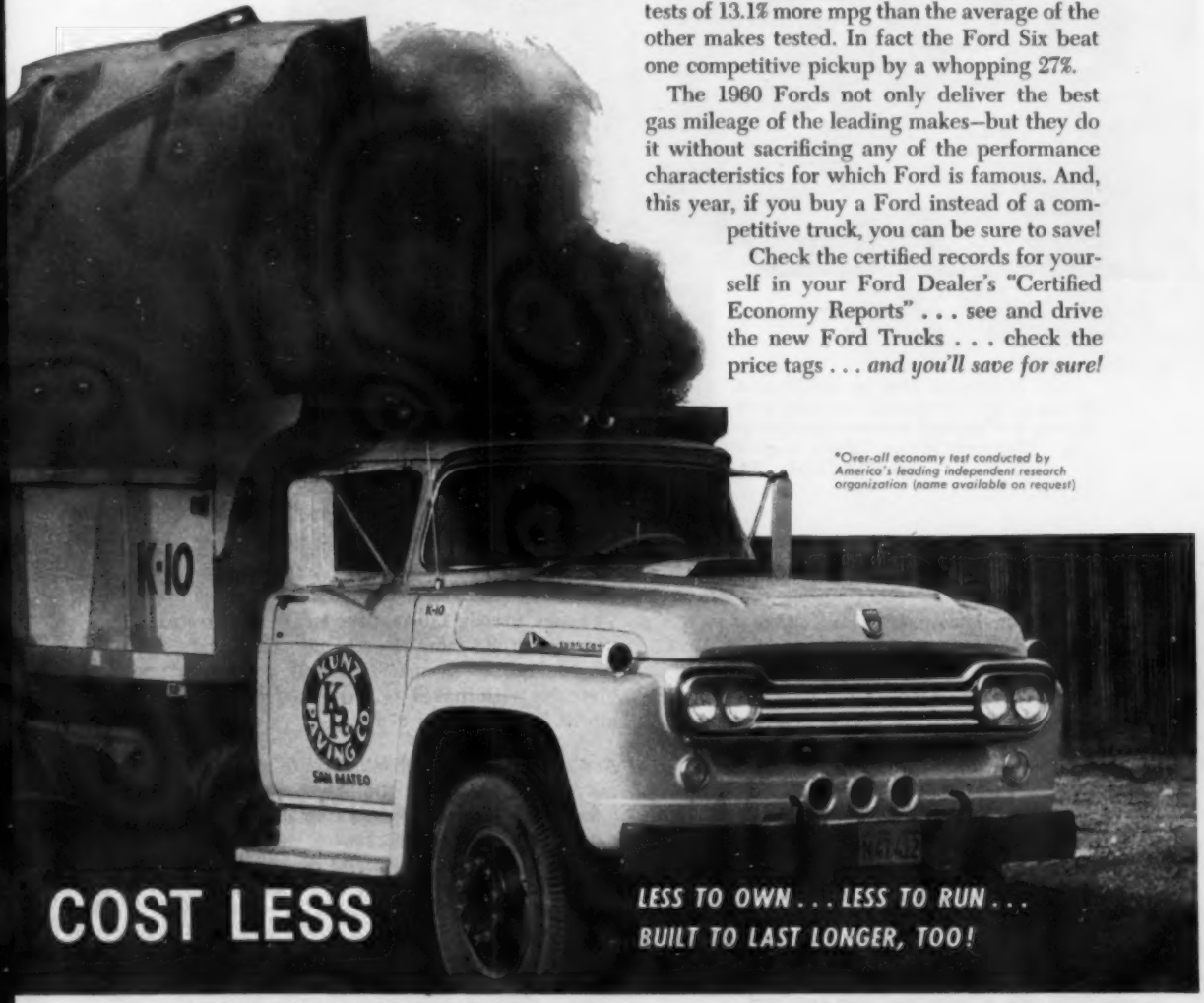
Ford Six delivers 13.1% better gas mileage in second running of Economy Showdown U.S.A.* Standard 1960 ½-ton pickups of the five leading makes were purchased from dealers just as you would and run both empty and loaded, over flat terrain and hills, at low and high speeds, under city traffic and retail delivery conditions.

Certified results show the Ford Six won *every* test—with a combined Ford advantage for all tests of 13.1% more mpg than the average of the other makes tested. In fact the Ford Six beat one competitive pickup by a whopping 27%.

The 1960 Fords not only deliver the best gas mileage of the leading makes—but they do it without sacrificing any of the performance characteristics for which Ford is famous. And, this year, if you buy a Ford instead of a competitive truck, you can be sure to save!

Check the certified records for yourself in your Ford Dealer's "Certified Economy Reports" . . . see and drive the new Ford Trucks . . . check the price tags . . . *and you'll save for sure!*

*Over-all economy test conducted by America's leading independent research organization (name available on request)

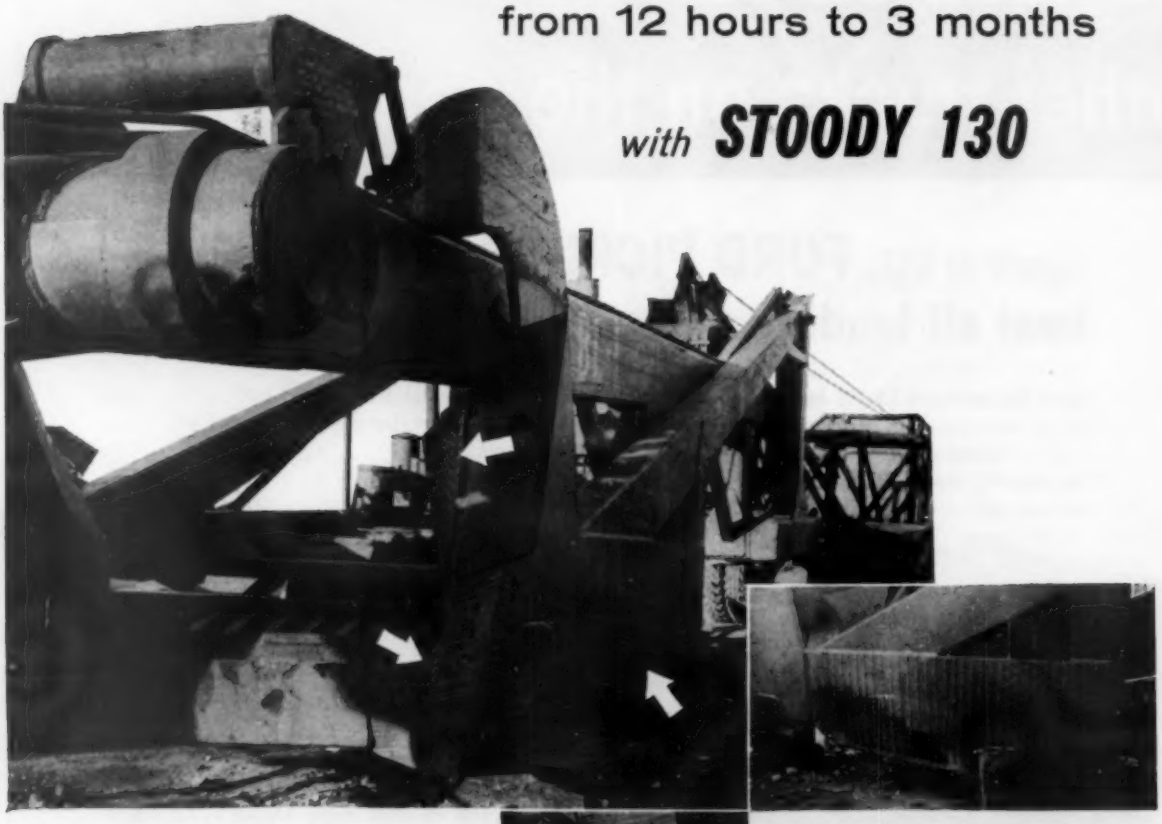


COST LESS

LESS TO OWN . . . LESS TO RUN . . .
BUILT TO LAST LONGER, TOO!

. . . for more details circle 312 on enclosed return postal card

How to **STRETCH** wear-life from 12 hours to 3 months with **STOODY 130**



Areas of severest abrasion on loader are indicated by arrows.

Moldboard plow is rebuilt with Stoody Nickel Manganese overlaid with Stoody 130 applied semi-automatically. Plowpoint is periodically touched up with Stoody 130.

Stringer beads of Stoody Self-Hardening protect sidewall. Heavier beads at base give added protection to area frequently operating under earth's surface.

ONE of the giant new loaders used by earth moving contractors recently broke records on a highway job in Central Ohio. Its loading capacity ... 1 ton per second! Working at this speed in abrasive gravel naturally shortens the life of wearing parts. To control wear and reduce replacements, hard-facing was tried. A survey, conducted to determine effectiveness of hard-facing and best alloy for the job, included the following considerations:

- Original cost of machine
- Downtime record
- Cost of replacement parts and frequency of replacement
- Labor cost of installation

Where moldboard plow points, for example, had previously required a shutdown for changes every 12 hours, Stoody 130 kept the entire unit in steady operation for 3 months with only occasional quick hard-facing touch-ups! Not only was downtime virtually eliminated but cost-per-ton of earth moved was markedly reduced.

For tips on prolonging wear life of all equipment, get your free copy of the Stoody Guidebook and descriptive folder on semi-automatic hard-facing. See your Stoody Dealer (check the Yellow Pages of your phone book) or write direct.

STOODY COMPANY

11908 East Slauson Avenue • Whittier, California

. . . for more details circle 381 on enclosed return postal card

MOBILE LUBE EQUIPMENT

Continued from page 133

minor repairs. Three major pieces of equipment can usually be serviced per man-hour. Many lube trucks are fitted with dual hose arrangements to permit two operators to use the same lubricants, thus doubling the number of units that can be serviced.

A 'round-the-clock operation presents a more complex operation. The lube truck (or trucks) is in continuous operation throughout each shift. The operator must search out each piece of equipment and service it on the spot. One large project involving a high percentage of dump trucks found it more advantageous to establish a stationary lube station along the haul road to service the dump trucks, while their lube truck was used to lubricate their heavy shovels and drill rigs at the work sites.

The opposite condition is where the size and relative immobility of the equipment require that it be lubricated on the job. With just eight lubricants the contractor can service a big dragline (for example), along with all other pieces of equipment using the same lubrication rig.

Proper servicing in the field involves more than just the application of lubricants. Air filters are usually cleaned and oiled daily. Oil drains and oil filter changes are made between 100 and 200 hours depending upon the severity of the operation and fuel filters are changed between 200 and 500 hours. A 5-day week operation utilizes Saturday for much of this type work.

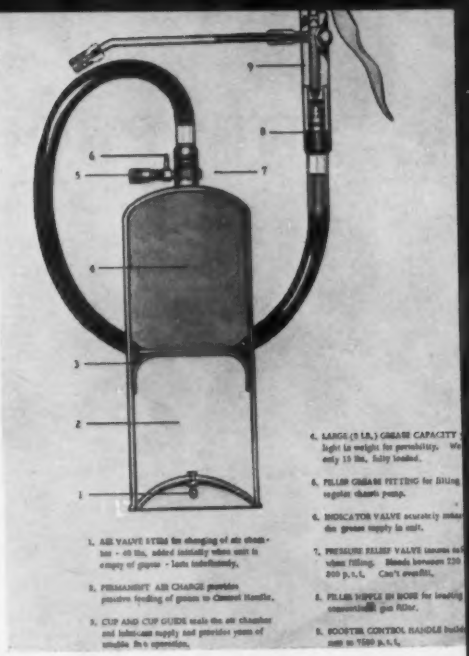


Figure 11 — A compact high pressure portable grease gun. (Courtesy of Aro Equipment Corp.)

Figure 12 — A compact trailer-mounted lubrication rig for general field use in servicing smaller equipment fleets. (Courtesy of Lincoln Engineering Co.)

General Maintenance Facilities

At any extensive operation major overhaul usually proceeds on a scheduled basis and contractors provide facilities to handle their equipment. While some maintenances is done outdoors, most big projects will have a field shop with an operating bay and a parts storehouse. Adjacent will usually be a shed for storage of tires and lubricants. The size of maintenance forces will vary according to the type of equipment in use. One contractor has a 30-man crew maintaining approximately 50 major pieces and 40 utility pieces in good repair.

Fueling Facilities

Each job has its own requirements for fuel storage and dispensing. (See Roads and Streets, March, 1960.) Some projects lend themselves to a gravity type of system while others find the best solution to be a rough duplicate of the familiar roadside service station.

Diesel Fuel Specifications generally follow the ASTM Grade 2-D with some contractors requiring a more stringent sulphur limitation than the allowable 1 percent maximum. Pour point is important to a contractor who must start and operate equipment in sub-freezing temperatures: it is of little importance to the operator in warm climates. The

Continued on page 211

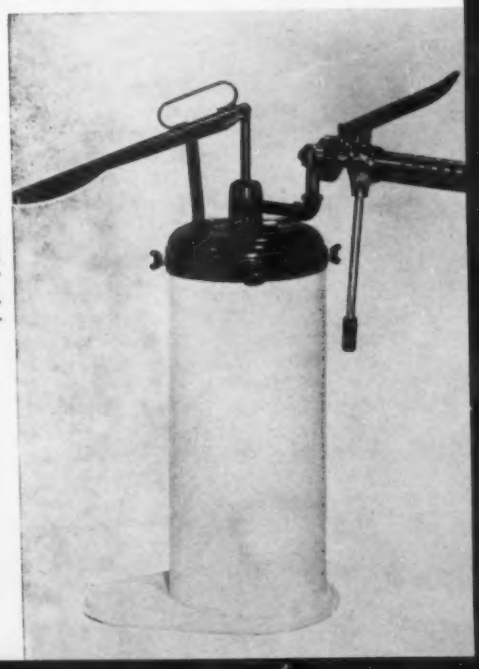


Figure 13 — A convenient type of high pressure grease gun and filler pump for farm equipment. (Courtesy of Balcrank Inc.)

NEW PRODUCTS

Listed here are reviews of new and improved equipment items, selected to aid our readers in purchasing. See reader service numbers on enclosed postcard.*

Ottawa Commando with Uni-Tools

Versatile Prime Mover

A complete line of contracting and materials handling equipment was unveiled recently by Ottawa Steel Division of Young Spring & Wire Corporation.

Called the Ottawa Commando, the rugged unit weighs 9,200 lb. and features a shuttle transmission —a split torque drive arrangement that permits full power hydraulic creep, solid direct drive or torque converter drive. The unit turns in a 24 ft. circle and is available in two or four wheel drive. Speeds range from a controlled creep at full throttle starting at 0 mph up to 35 mph.

A large variety of matched tools for the prime mover are available or planned. Each of these tools becomes completely self-contained and self-propelled when mounted on the unit. For example, the Hydra-Hammer is a breaker-tamper pile driver. It handles concrete breaking, cuts asphalt, tamps fill. It also becomes a self-contained backhoe that digs 12½ ft. deep in any position of a 190 deg. swing. 7,000 lb. of digging power can be applied at the point of bite. For self-loading and unloading, the power crane handles pipe, steel forms, etc. Capacities are up to 7,000 lb. It has a full 360 deg. rotation. Other attachments not shown in the accompanying photo are the Strato-Tower for servicing overhead roadway lighting units, a sweeper for clean-up of roads and others.

Young Spring & Wire Corporation, Ottawa Steel Division, Ottawa, Kansas.

for more details circle 101 on Enclosed Return Postal Card.

15, 20 GPM Pumps

A "Royalier" series of high pressure pumps incorporating a new principal to provide a pulsation-free stream of spray material has been introduced by John Bean Division of Food Machinery and Chemical Corporation.

The units are additions to the established line of John Bean pumps, including the Royal, Royalette and Spartan. The new pumps are offered as the J-15 Royalier, with 15 gpm capacity at up to 400 lb. pressure, and the J-20 with 20 gpm capacity at up to 300 lb. pressure.

The pumps are of fully enclosed construction with four corrosion and wear-resistant sapphite cylinders, ball bearings and spring loaded stainless steel disc-type valves. These pumps have also been developed for tractor PTO mounting and as an option on the firm's high clearance self-propelled sprayer.

John Bean Division, Food Machinery & Chemical Corp., Lansing 4, Mich.

for more details circle 102 on Enclosed Return Postal Card.

DC Magnet Brake

General Electric has redesigned its line of DC magnet brakes to provide increased reliability and simplified maintenance.

Key features are improved epoxy-potted magnet coil assembly, single-end adjustment and slip-in brake lining replacement. The brakes in 8, 10, 13, 16, 19 and 23 in. wheel sizes are spring-set, shoe type friction brakes built to NEMA-AISE standards. They can be left or right-hand mounted with no change in pins or bolts required. Design improvements in the coil assembly are said to simplify the job of replacing coils for brake rating changes or maintenance. When unbolted, the complete coil and magnet housing assembly can be hoisted vertically from the brake frame with a simple lift.

General Electric Company, Schenectady 5, N.Y.

for more details circle 103 on Enclosed Return Postal Card.

59 HP Crawler

A new 59 hp crawler tractor has been announced by Minneapolis-Moline Company.

With torque converter and instantaneous full-power reversing shuttle, the new crawler, designated the MoTrac, is available with Moline diesel and gas-

*To readers outside of the United States—postal rules forbid use of business reply cards outside of the U.S. Please write to us listing the numbers, month and name of magazine, and mail with your name and address to Inquiry Dept., Roads and Streets, 22 W. Maple St., Chicago 10, Ill., U.S.A.

New MoTrac Crawler

oline engine models, fully integrated with the 5-speed transmission. The unit's engine is a 4 cylinder model and delivers 50 hp at 2,000 rpm with gas and 53 hp at 2,000 rpm with diesel. A "Hydro-Shuttle" direction control, activated with heel and toe for forward-reverse, leaves operator's hands free for full attention to attached tools and steering.

The new crawler is of all-steel forged and welded construction. The basic frame is electric-welded heavy steel channel supporting engine, transmission and final drive assemblies, with a full steel belly plate to protect the engine and transmission.

The unit is a 5-roller crawler with a cantiliver-supported top idler and 2,086 sq. in. of ground contact. The rollers are designed for 1,000-hour service. Street plates or grousers of 14 in. width are standard equipment and optional in 12 or 16 in. widths.

Minneapolis-Moline Company, Hopkins, Minn.

For more details circle 104 on Enclosed Return Postal Card.

All-Purpose Spreader

Availability of a newly-designed, all-purpose spreader has been announced by Good Roads Machinery Corporation.

Called the "Rollgate", the new spreader is designed for spreading sand, salt, cinders, gravel, slag or other material for ice control in the winter, ashing snow covered streets, seal-coating highways and soil stabilization of secondary roads. Features of the unit include welded steel construction, 8-ft. wide spread, ability to spread as little as 75 lb. of chemicals per mile up to

Good Roads Spreader

any desired amount, and spreading of material from a feather edge to a 3 in. depth when seal coating.

Fitting any 7-ft., 6 in. or 8-ft. wide dump truck body, the spreader can be operated from the cab through the use of one lever. Hydraulic drive permits spreading while the truck is moving forward or backwards.

Good Roads Machinery Corporation, Minerva, Ohio.

For more details circle 105 on Enclosed Return Postal Card.

Grader Blades

The Uddeholm Company of America is introducing a new line of cutting edges for motor graders. The blades are made of a specially developed alloy of chromium-silicon tool steel and tough hardened to approximately 475 Brinell.

Standard sizes are available for all commonly used graders, the maker states. In addition to straight-edged grader blades, saw-toothed blades for ice-scraping, dozer cutting edges with endbits, shovel cutting edges, scraper and snowplow blades are obtainable.

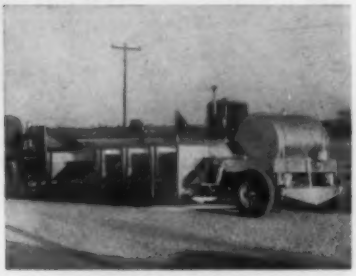
The Uddeholm Company of America, 155 E. 44th St., New York 17, N.Y.

For more details circle 106 on Enclosed Return Postal Card.

Surface Heater

The Grace Surface Heater will heat cover stone after it is in place so it melts into the asphalt cement as well as or better than it would in hot weather, states the manufacturer, W. E. Grace Manufacturing Co.

The heater is 10 ft. wide and about 30 ft. long. It burns 50 to 60 gal. of diesel fuel per hour and is suitable for pulling at from 60 fpm to 1½ mph. No flame touches the road; four large



Grace Surface Heater

New

ROPE THREAD

Brunner & Lay Drilling Tools

ROPE THREAD, CARBIDE ROK-BITS
ROPE THREAD, COUPLINGS
ROPE THREAD, CARBO-ROK SECTIONAL RODS
ROPE THREAD, STRIKING BARS

Write, Brunner & Lay, Inc., 9300 King St., Franklin Park, Ill. Plants: Albuquerque, Asheville, Birmingham, Denver, Dorchester(Boston), Los Angeles, Philadelphia, Portland, Sacramento, Seattle, Lachine, P.Q.

Brunner & Lay Products

CARBIDE ROK-BITS • INTRA-LET STEEL • DRILL RODS • COUPLINGS, ADAPTERS & EXTENSION STEEL • PNEUMATIC TOOL ACCESSORIES • MOIL POINTS, CLAY SPADES, ASPHALT CUTTERS, ETC.

. . . for more details circle 384 on enclosed return postal card

California paving contractor says:

Liked A-W roller so well, bought two more!

"Our first A-W performed so well that we bought two more over a period of 5 years. We use them to roll both subgrade and finish courses. They are fast and efficient machines; and can deliver the 95% relative compaction required. Torque converter allows more positive control of rollers for uniform compaction. Hydraulic controls make them easy to operate. Plenty of visibility for operators to do precision jobs. The A-W rollers are well-built; maintenance has been no problem."—*Pat Regan, Exec. Vice Pres., A. J. Raisch Paving Co., San Jose, Calif.*

A-W 3-wheel rollers available in 8 to 11, 10 to 12, 12 to 14-ton models; tandems 5 to 8, 8 to 12, 10 to 14 tons. Portable tandem variable between 3½ to 6 tons. Vibratory Roller Compactor and Widener Attachment also available. Choice of gasoline or diesel power; torque converter with 4-speed transmission optional.

Austin-Western offers you a number of important dollar-saving features not available on many other makes of rollers. Let us prove to you the ways in which A-W rollers can increase your compaction efficiency and decrease maintenance and operating costs. Contact your nearby Austin-Western distributor or write directly to us.

Austin-Western

CONSTRUCTION EQUIPMENT DIVISION, AURORA, ILL.

BALDWIN · LIMA · HAMILTON

Power graders • Motor sweepers • Road rollers • Hydraulic cranes

. . . for more details circle 279 on enclosed return postal card

New Products

burners heat the refractory lined heating pan so it glows red, heat is by radiation. Heating pan can be lowered to within 2 in. from the pavement, or raised to 12 in. from it hydraulically. A four wheel trailer mounting or a semi-trailer mount is available; semi-trailer connects to a regular truck-tractor fifth wheel.

W. E. Grace Manufacturing Co., 6000 S. Lamar St., Dallas 15, Texas.

For more details circle 107 on Enclosed Return Postal Card.

Soil Scraper

A new Economy Model Soil Scraper has been released by Servis Equipment Company.

Called the "Seco Jr." Soil Scraper, it has the heavy duty qualities of the firm's regular S-66 Model, except that scarifier teeth assembly will be optional, and when scarifier teeth are specified, they will be manually inserted, instead of using the hand lever feature for lifting that is found on the standard models.

Scarifier Teeth for Servis Scraper

Servis Equipment Company, 1000 Singleton Blvd., Box 1590, Dallas, Texas.

For more details circle 108 on Enclosed Return Postal Card.

Mobile Crane

Unit Crane & Shovel Corp. announces the newly-improved Model 357, a self-propelled, rubber tired Mobile Crane of 15 ton capacity.

Unit Crane Model 357

The new model converts easily and quickly into a ⅝ yd. clamshell or dragline. Mounted on six pneumatic tires, (duals in the rear) the unit offers flexibility for handling a wide range of operations on or off the highway. One engine powers all functions and one man controls the machine. Pendant type boom rigging is furnished as standard equipment. Features include two-pin adjustable double telescopic outriggers; full time hydraulic power steering; heavy duty, structural steel frame; one-piece alloy steel turntable gear and roller path; easily adjusted twin hook rollers and air brakes on all wheels.

Unit Crane & Shovel Corp., 6509 W. Burnham St., Milwaukee, Wis.

for more details circle 109 on Enclosed Return Postal Card.

Lightweight Pumps

A new line of lightweight centrifugal pumps called "C MC Wonder-Lites" has been announced by Construction Machinery Company.

The new line features an impeller and volute of abrasion-resistant cast iron for long life, and pump and body engine of durable, lightweight aluminum. The units are applicable to suction or booster pumping and will prime automatically on suction lifts up to 25 ft. The 2 in. model, W12A, will

"C MC Wonder-Lite" Pumps

prime at 25 ft. in less than one minute. The 3 in. model will pump more than 19,000 gph of water. Units are available in four models from 1½ to 3 in. sizes and are powered by 4-cycle Briggs & Stratton motors, which are of all aluminum construction to carry out feature of lightweight portability.

Construction Machinery Company, Waterloo, Iowa.

For more details circle 110 on Enclosed Return Postal Card.

Asphalt Repaver

The Cutler Repaver, a product of Cutler Engineering Company, a Division of Asphalt Equipment and Engineering Company, is a road maintenance machine that combines all equip-

Continued on page 170

A-W grader builds service road over desert sand for highway project earth movers.

Austin-Western works where other graders can't!

Only Austin-Western Super Series graders have 6-wheel drive and 6-wheel steering. These two features permit an A-W grader to work with heavy loads where other makes can't even operate!

A-W walks right in

Silva & Hill Construction Co., South San Gabriel, Calif., report, "On a recent job along the Santa Ana River, we had to grade heavy sand. Our Austin-Western Super 200 walked right through the sand with a heavy load on the blade. It had plenty of traction. All-wheel drive made the difference.

"Hydraulic control is another good feature. It allows the operator to instantly switch from back sloping to fine grading with the flick of a lever."

Rear steers too

It's virtually impossible to get an A-W stuck—in sand, snow, mud or ice. With power up front and the ability to steer the rear too, an operator can carry a full load on his blade without sidethrust while he works forward in a straight line.

The many operational advantages of Austin-Westerns help spell out a story of increased job profits through dependable, efficient operation with low maintenance costs. A-W graders are available in 6-wheel Super models or 4-wheel Pacers in a wide range of weight classes, from 16,000 to 30,000 pounds, and power ranges, from 106 to 143 horsepower. Why not get all the facts. Call your A-W distributor or write to us now!

Austin-Western

CONSTRUCTION EQUIPMENT DIVISION, AURORA, ILL.

BALDWIN · LIMA · HAMILTON

Power graders • Motor sweepers • Road rollers • Hydraulic cranes

. . . for more details circle 280 on enclosed return postal card

Now!...Euclid Twin-Power

TS-14 all-wheel drive "Twin"

*heaped capacity at 3:1 is 16 yds., at 1:1 slope, 20 yds.

HERE'S BIG NEWS for scraper users. The many cost cutting advantages of all-wheel drive are now available in a medium-size scraper, the Euclid Model TS-14. With Twin-Power and a total of 296 h.p. this new "Euc" has already proved itself an outstanding performer. A one-man, one-machine earthmoving spread, it gets more work done at lower cost than any other scraper of comparable size . . . its high productive capacity brings a better return on investment.

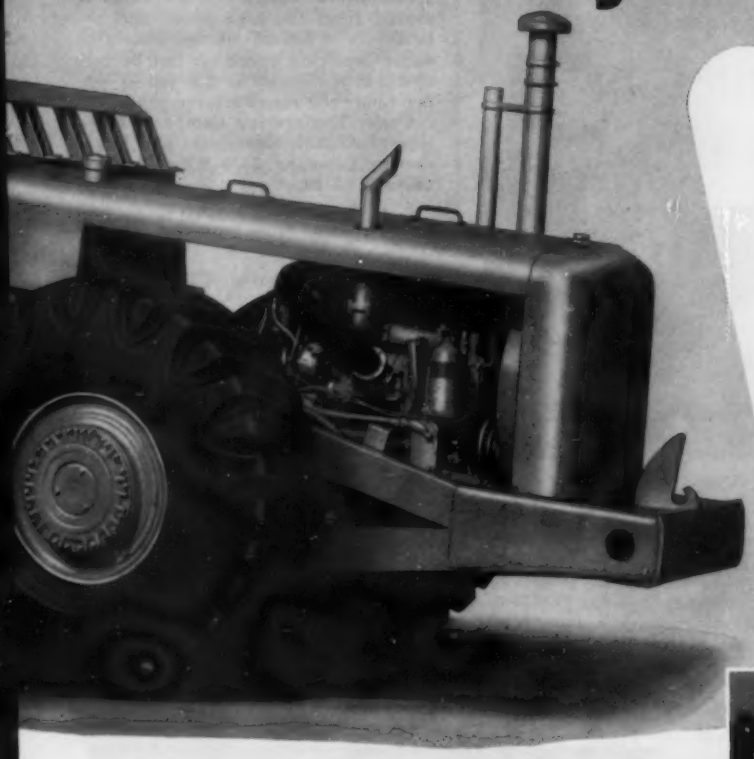
Like the widely used 24 yd. "Twin", this new Euclid has a separate Torqmatic Drive and power train for each axle. It self-loads in practically any scraper material and with a pusher is a big producer on even the toughest jobs. There's plenty of power and traction to pick up a heaped load in a hurry . . . pull out of the cut fast . . . and highball on the haul and return.

The TS-14 works on grades and under adverse job conditions that stall other scrapers. Its ability to do a wide range of work — without pusher assistance — makes it the most versatile scraper in its class. This new "Twin" can lengthen your work season and give you a bidding advantage on that next job. Get the facts and figures from your Euclid dealer.

EUCLID Division of General Motors • Cleveland 17, Ohio

Check the advantages of all-wheel drive in this new 14 yd. Twin-Power scraper!

in this 14 yd.* scraper!



TS-14 features that cut dirt moving costs

- 2 engines — 296 total h.p.
- all-wheel drive
- NoSpin differentials
- 2 Torqmatic Drives
- converter lock-up
- 20 yds. heaped (14 yds. struck)

All-wheel drive and 296 total horsepower enable the TS-14 to get heaped loads without pusher assistance . . . make it a one-man earthmoving spread with more versatility than any other scraper in its class. Low wide bowl and four-section cutting edge speed loading and cut cycle time . . . blade sections are identical, adjustable and reversible.

The TS-14 works independently of other equipment . . . in the cut and on the fill . . . has the power and traction to self-load fast and work under adverse grade and job conditions that stop single engine scrapers. Its versatility and work-ability make this new "Euc" a top performer for low cost dirt moving on any scraper job . . . big yardage projects as well as close quarter work where concentration of equipment isn't practical.

Separate Torqmatic Drives for each axle provide a smooth, steady flow of power. There's no clutching, no delay, and no loss of momentum when changing to any of the 4 forward speeds . . . speed changes are made by a simple flick of the wrist at the air assist remote control lever. Converter lock-up assures maximum efficiency on grades and long hauls . . . this direct drive provides more usable power from each engine.

GM GENERAL MOTORS EUCLID

EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE

Cutler Four-Step Repaver

Continued from page 167

ment necessary to repair and recondition asphalt pavements.

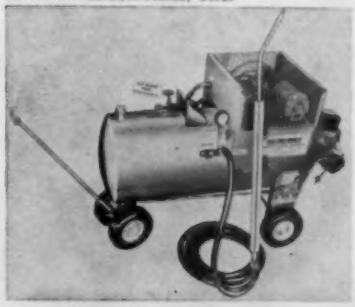
For winter maintenance, the unit, with its heat and compaction can dry out areas and literally vulcanize the patching, maker states. Heating is accomplished by using five air atomized fuel burners operating inside a refractory lined chamber and firing through a heated grid roll which distributes the heat and transmits it to the pavement. A hydraulically controlled grader blade follows the heating chamber. This blade levels off high spots and deposits excess materials in the depressions. Heated leveled surface is compacted by heated compaction rollers. The unit is designed to operate back and forth over a defective area until the job is accomplished. Lastly, excess hot mix is shaved from the high spots, and retained in a heated storage bin. The entire repairing operation can be carried out at the rate of 200-300 sq. yd. per hour, the manufacturer reports.

Cutler Engineering Company, Division of Asphalt Equipment and Engineering Company, 5435 West 63rd St., Chicago 38, Ill.

For more details circle 111 on Enclosed Return Postal Card.

Improved Steam Cleaner

A hot water rinse attachment is now standard equipment on the Electro-Magic Motor Steam Cleaner manufactured by Electronics, Inc.



Electro-Magic Steam Cleaner

CONCRETE PROFITS INCREASED

TK TREATMENT saves time and money. Cures, Seals and Hardens concrete in one operation. Insures complete protection of green concrete through the critical period.

NO MORE

- Burlap to moisten
- Polyethylene or paper to anchor
- Curing membranes to agitate
- Sandblasting before painting or sealing joints

Spray on just one coating of TK TREATMENT for rainfall protection within 30 minutes—provides up to 98% moisture retention—remains as a part of the concrete to repel salts, greases and alkalies.

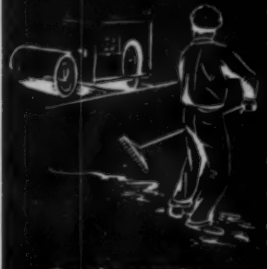
TK TREATMENT is a specially formulated chlorinated rubber compound that meets ASTM-C-156-55T, C-309-53T: AASHO Designation M-148; CRD-C-300 and CRD-C-302. Test reports furnished upon request. Get complete details from your TK representative or write to:

W. F. MACKLIN COMPANY, INC.
Dept. RS
336 Taft Street, N. E. Minneapolis 13, Minnesota

. . . for more details circle 356 on enclosed return postal card

ONE MAINTENANCE TEAM *will do the work of two with* KOTAL Bituminous STOCKPILE MIX

Save Time and Money — Get Longer Lasting Results — Patching Jobs Last With Kotal! No repeat repairs. Easy to use — at any time — under any conditions when men can work.



Here's why you can do more maintenance work and do it better with Kotal Stockpile Mix

- It's tough, more stable and more durable
- It's cohesive and adhesive
- It resists stripping and destructive action of water
- Asphalt retains its life far beyond normal length of time.
- It's easily laid with ordinary tools and equipment
- It remains workable in stockpile and is readily available the year 'round
- It is easily transported as needed
- Patching can be done under any weather conditions
- Stretches your maintenance period over entire year
- Consolidates readily under traffic

Get the complete story, write to:

KOTAL Company
119 SUMMIT AVENUE • SUMMIT, N. J.

. . . for more details circle 339 on enclosed return postal card

The attachment allows the operator to rinse or flush by simply turning a valve. Coils of the steam cleaner itself can also be cleaned of solvents and other solutions with the new attachment; attachment can be used wherever standard water pressure is available. The unit also features push-button controls and 100 lb. of steam pressure in 90 seconds.

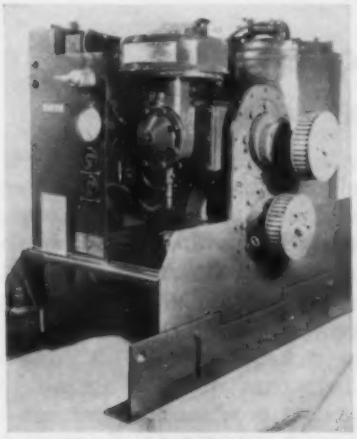
Electronics, Inc., Vermillion, S.D.

For more details circle 112 on Enclosed Return Postal Card.

Improved Compressor

Worthington Corporation's 125 cfm Rotary Power Take-Off Compressor is now available in a new, more compact version.

The unit is 31½ in. high, 39¼ in. wide and 28 in. long, with a weight of 850 lb. The older model has corresponding dimension of 39 in., 28 in. and 38 in., and weighs 950 lb. It consists of a two-stage oil-cooled rotary compressor, speed control, minimum



Worthington 125 C F M Unit

pressure valve, engine governor, oil cooler and combination air-oil reservoir. The component parts are integrally mounted on a sturdy, welded steel frame to form a compact unit. The compressor can be mounted on jeeps, trucks and tractors, and is completely controlled from the cab by the driver. The unit is driven through a power take-off by positive drive belts.

Worthington Corporation, Holyoke, Mass.

For more details circle 113 on Enclosed Return Postal Card.

Track Pin Press

An improved Track Pin Press, No. Y360-A, for servicing tracks on small crawler-type tractors, is announced by Owatonna Tool Co.

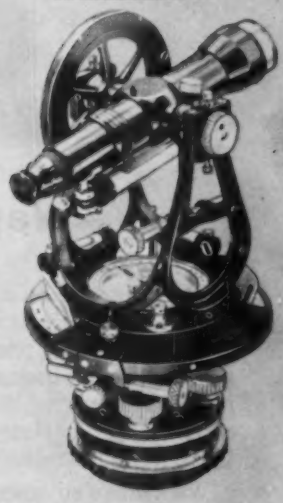
Operating time required for removing and replacing pins and bushings is said to have been reduced by the press, which incorporated a 35-ton, single cylinder, double acting ram, and the OTC

Continued on page 176

NOW! ONLY BRUNING GIVES YOU BOTH!

BRUNSON

PATH



BEST at any price!

BEST for the price!

Whatever you're looking for in surveying instruments, you can look to Bruning and get it. Here, without question, is the most complete line of surveying equipment on the market, featuring these two great names:

BRUNSON . . . for top quality. Famous for their ball bearing construction. Brunson instruments have proved they can withstand the most severe extremes of heat, cold, moisture, and dust. Preloaded and accurate to 5-millionths of an inch, Brunson ball bearings provide highest possible instrument accuracy.

PATH . . . for top value. These moderately priced instruments offer one of the rarest surveying values available today. PATH optics are unsurpassed anywhere. Japanese lenses provide superior definition, magnification, and accuracy.

There you have it: top quality, top value—all backed by Bruning's nation-wide service that gives you the product and help you need where and when you need it. You owe it to yourself to mail the coupon below.

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Charles Bruning Co., Inc. Dept. 4-HA
1800 Central Rd., Mt. Prospect, Ill.
Offices in Principal U. S. Cities
In Canada: 103 Church St., Toronto 1, Ont.

Please send me information about
☐ BRUNSON Surveying Equipment
☐ PATH Surveying Equipment

Name _____ Title _____
Company _____
Address _____
City _____ County _____ State _____

. . . for more details circle 288 on enclosed return postal card

Advance Progress Report

CF&I-Wickwire develops DOUBLE

New wire drawing technique gives you longer-lasting wire rope

CF&I-Wickwire's premium wire rope – Double Gray – has now been improved by a remarkable new wire drawing technique. This new wire rope – Double Gray-X – provides EXTRA LONG LIFE.

Wickwire's advanced wire drawing process is the joint effort of our research engineers, metallurgists and key production people. They sought to reduce the friction between the wires within the rope itself, thus producing a wire rope with greater resistance to bending fatigue. An important step in Wickwire's new wire drawing process is the use of *molybdenum disulphide.*

"Moly Disulphide" builds a thin, permanent molecular shield around each wire. Coupled with Wickwire's other advanced wire processing techniques, it gives these results:

- *Friction-free interaction of the individual wires in every strand of Double Gray-X* – A molecular jacket of Moly Disulphide on each wire helps cushion them against the effects of bending, crushing and abrasion. As the rope operates over sheaves, for example, the molecular shield tends to prevent the wire surfaces from grinding against each other, reducing friction and wear.

a superior wire rope

GRAY-X

- *Smoother surface to the wires*– In any wire, tiny imperfections occasionally form on the surface. These "weak links" can cause premature breaking of the wires and impair the life of the rope. Moly Disulphide helps eliminate any minute nicks, creating smoother-surfaced wires.
- *Higher degree of toughness which is essential to longer wire rope life*– Moly Disulphide greatly minimizes the friction involved in the drawing operation, thus preventing the wires from "heating up". This assures the correct physical properties for every wire in Double Gray-X and helps the wire retain its original toughness.

Double Gray-X will be made in a wide range of sizes and constructions to give greater operating economy and reduced downtime for all types of rope-using equipment. It will be available soon from CF&I-Wickwire's chain of warehouses and through a network of nationwide distributors.

EXTRA STRENGTH

In addition to longer life, Double Gray-X gives you the extra strength of Double Gray Wire Rope. Made of extra improved plow steel with an Independent Wire Rope Core, this rope gives 15% higher breaking strength than the catalog breaking strength of an improved plow steel rope with IWRC.

7484

WICKWIRE ROPE

THE COLORADO FUEL AND IRON CORPORATION

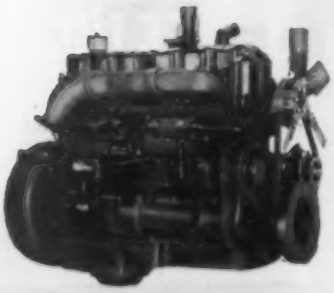
CF&I STEEL

In the West: **THE COLORADO FUEL AND IRON CORPORATION**—Albuquerque • Amarillo • Billings • Boise • Butte • Denver • El Paso Farmington (N. M.) • Ft. Worth • Houston • Kansas City • Lincoln • Los Angeles • Oakland • Odessa (Tex.) • Oklahoma City Phoenix • Portland • Pueblo • Salt Lake City • San Francisco • San Leandro • Seattle • Spokane • Tulsa • Wichita
In the East: **WICKWIRE SPENCER STEEL DIVISION**—Boston • Buffalo • Chattanooga • Chicago • Detroit • Emlenton (Pa.) New Orleans • New York • Philadelphia

. . . for more details circle 300 on enclosed return postal card

For mixer and dumper service...

YOU NEED ALL THE TRUCK YOU CAN GET



Mack-Built Engines. Mack gasoline and diesel engines are the ultimate in design and construction as proved by the famous Mack Thermodyne® diesel which consistently sets new records of economy not only when new, but after hundreds of thousands of miles of service. Mack engines are available in a wide range of power options—from 150 to 205 hp—to meet every hauling need of the construction industry. The ability of all Mack engines to maintain peak efficiency for years of low-cost service, with only routine maintenance, has established them as leaders in the field.

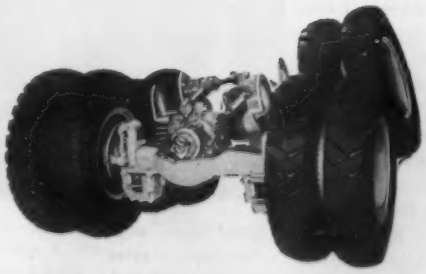
Mack-Built Front-Driving Axles. The high-capacity, all-gear-drive front axle, shown above, has compact, Mack-designed triple-reduction gearing fully enclosed in a rugged three-piece assembly. This provides positive lubrication and full protection against water and dirt. Other features developed to meet demanding front-wheel-drive requirements include exceptionally high road clearance and easy-steering qualities obtained through elimination of universal joints.

Mack makes sure you get all the truck you need by designing and building its own vital components—to the highest standards in the industry. Mack components are built by Mack for Mack trucks alone. Mack Trucks, Inc., Plainfield, New Jersey. Mack Trucks of Canada, Ltd., Toronto, Ontario.

MACK
FIRST NAME FOR
TRUCKS

MACK
for over 7 straight years
NO. 1
by far in sales of diesel trucks

Mack-Built Transmissions. Ranging from five to twenty speeds, Mack single-unit transmissions are engineered with ideal ratio steps and built to stand up to heavy-duty hauling far longer and with less attention than any others. The twenty-speed Quadruplex, shown here, offers the full gear range necessary for the most rigorous dumper and mixer service. All Mack transmissions provide maximum strength, longer life and smoother action, thanks to the use of the finest gear metals known . . . to painstaking precision manufacture . . . and to exclusive Tetrapoid gear design.



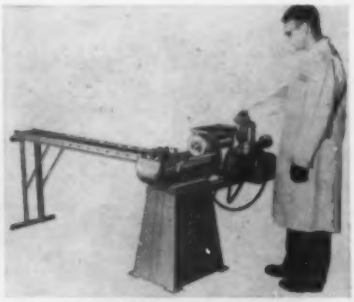
Mack-Built Balanced Bogies. Macks perform where other trucks bog down because of Mack's exclusive Balanced Bogie with Power Divider. This four-wheel-drive, tandem rear-axle assembly includes an interaxle differential that directs the power to the wheels having greater traction. Greatly increased tire life and ease of handling at higher speeds and in hauling heavy loads over rough terrain are major benefits of the Balanced Bogie's self-aligning design in which axles diverge slightly from parallel so tires roll freely in turning.

7413

. . . for more details circle 351 on enclosed return postal card

New Products

Continued from page 171



OTC Y360-A Press

"Vanguard" Y-26 series two-stage hydraulic pump. To facilitate handling of track, 5-ft. sections of track roller conveyor are available which may be bolted together to any desired length.

Tooling for the press has been designed to handle track used on the following tractor models: John Deer-40C, 420C, 430C, 440IC, 440ICD and Mc J.I. Case-200, 300, 310, 320, 400, 420, 500, 520, 600 and M-3; Oliver-OC-3, OC-4 and OC-6.

Owatonna Tool Company, 435 Cedar St., Owatonna, Minn.

For more details circle 114 on Enclosed Return Postal Card.

Self-Propelled Roller

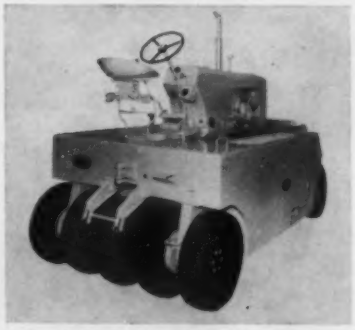
Two improved models of self-propelled rollers are available from the Tampo Manufacturing Company.

The models SP91, 10 tons, and SP-111, 12 ton both feature an increase in maximum recommended load capacity and the addition of hydraulic wheel brakes. Torque converter drive and automatic power shift reverse operation, with six speeds forward and reverse, are standard equipment on both models. Recommended loads are: 20,000 lb. for the nine wheel unit, and 24,000 lb. for the 11 wheel unit.

Features of the machine include hydraulic wheel brakes at the driving wheels and separate differential brakes at the transmission; also final drive chains operating in constant oil bath, constant mesh, helical gear transmission and interchangeable wheels.

Tampo Manufacturing Company, Inc., P.O. Box 4248, San Antonio, Texas.

For more details circle 115 on Enclosed Return Postal Card.



Tampo Pneumatic Roller

Concrete Truck Mixer

A new 7 cu. ft. truck mixer for concrete has been introduced by the Jaeger Machine Company.

The truck is reported to be capable of carrying 16 percent more payload because of a weight saving mixer framework and mounting made of aluminum. Weight saving is said to be 1,500 to 1,600 lb. The unit will resist corrosion and rust and require minimum maintenance, the manufacturer states.

The Jaeger Machine Company, 920 Dublin Ave., Columbus 16, Ohio.

For more details circle 116 on Enclosed Return Postal Card.

Nine Wheel Roller

A new nine wheel pneumatic tire, self-propelled roller has been announced by Western Equipment Division, Douglas Motors Corporation.

Western's model 12-SP is powered by a 57 hp 4 cylinder gasoline engine complete with torque converter, reverse shuttle drive, 5 speed transmission and hydraulic steering. Standard models are

HELTZEL

NEW STANDARD CONCRETE BUCKETS

• The new Heltzel standard concrete bucket—"The heavy weight bucket at a light weight price"—features all-steel, all-welded construction. Handles all types of materials from grout to dry mix. Designed to assure an empty bucket with every pour.

- Steep hopper slopes
- Self-cleaning gates
- Accurate, adjustable discharge control
- Self-locking, double arc clam shell gates

HELTZEL STEEL FORM & IRON CO.
WARREN, OHIO

. . . for more details circle 383 on enclosed return postal card

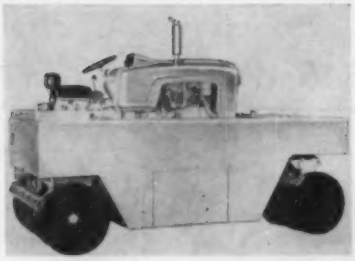
SAND BLAST
the easy RUEMELIN way!

A practical Sand Blast Generator for all types of outdoor cleaning work. Removes rust scale, paint. Cleans bridges, removes laitence from cement. Cleans ready-mix trucks and highway equipment prior to re-painting. Equipped with remote control with deadman valve for stop and start *at the nozzle!* Wet type nozzles also available if desired. Portable units can be equipped with hi-speed mountings for highway trailing.

Write for descriptive bulletin.

RUEMELIN MFG. CO.
1990 N. PALMER STREET MILWAUKEE 12, WIS., U. S. A.
MANUFACTURERS AND ENGINEERS — SAND BLAST AND DUST COLLECTING EQUIPMENT — WELDING FUME COLLECTORS

. . . for more details circle 367 on enclosed return postal card



Western Pneumatic Roller

equipped with oscillating front wheels, fully enclosed chain drive, 12 v. battery with starter and generator. Oscillating drive wheels, sprinkler bars and cocoa mats, front and rear lights are optional features. With special ballasting, the unit has been engineered to weigh a total of 30,000 lb. creating a weight per wheel of 3,140 lb.

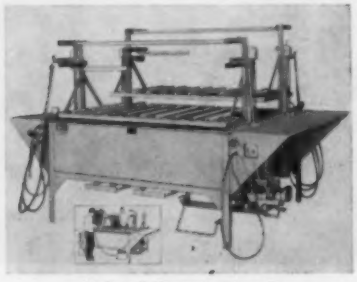
Western Equipment Division, Douglas Motors Corporation, Milwaukee, Wis.

For more details circle 117 on Enclosed Return Postal Card.

Radiator Repair Bench

Their newest unit of radiator servicing equipment, the Model 70 Dual Test and Repair bench, is announced by Inland Manufacturing Company.

The extra-large tank of the unit is designed specifically for the construction industry where unusually large radiators must be serviced. Two eleva-



Inland Repair Bench

tors can be operated simultaneously to accommodate two large radiators at once. Separate ½ hp sealed motors and heavy duty drives are provided, one for each of the two elevators. Tank itself measures 72 in. by 72 in. by 18 in.

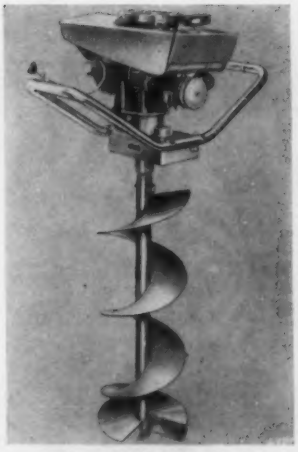
Inland Manufacturing Company, Dept. T 228, 1108 Jackson St., Omaha 32, Nebr.

For more details circle 118 on Enclosed Return Postal Card.

Portable Power Drill

General Equipment Company has recently announced its 1960 model of the General Portable Power Drill.

The new drill features a low-torque single blade pattern earth auger designed to dig fast and smoothly and with less operator effort in all types of earth. It is especially suited for drilling in sticky clay soil. The 27-in. long



General Drill with Auger

continuous auger flight carries aggregate out of the hole as it deepens. The drill is available with augers in 4, 6, 7, and 8 in. sizes. Powered by a 2½ hp Clinton air-cooled engine, it is built for heavy duty and easy starting in all kinds of weather. A centrifugal clutch engages automatically when the throttle is pressed and disengages when the throttle is released, stopping the auger while the engine idles. Augers in a variety of sizes from 2 in. to 8 in. in diameter are available.

General Equipment Company, Owatonna, Minn.

For more details circle 119 on Enclosed Return Postal Card.

Masonry Saw

A new portable masonry saw has been announced by Champion Manufacturing Company. Called the Tak-A-Bout "Jr.", the new saw is designed for use on scaffolds, on the back of a truck, or on a work bench. The unit is available with a 1 or 1½ hp fan-cooled

Champion Tak-A-Bout "Jr."

motor. It features 14 in. blade guard capacity, a self priming pump, a diamond lock and a removable mandrel. Both wet and dry cutting models are available, and the saws can use abrasive or diamond blades.

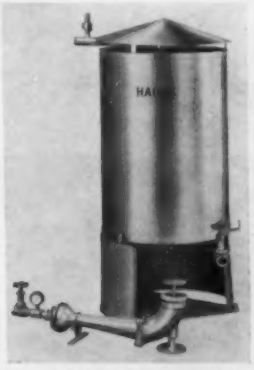
Champion Manufacturing Company, 3700 Forest Park Ave., St. Louis 8, Mo.

For more details circle 120 on Enclosed Return Postal Card.

Portable Water Heater

A new, readily portable, water heater capable of 600 gph of 180 deg. F. water is announced by the Hauck Manufacturing Co.

The unit is designed for use in cold weather concrete mixing operations in the field. The Model 312G produces 125 deg. F. within 2 min. after lighting burner, the maker states. It in-



Hauck 312G Water Heater

cludes a built in hot water recirculating system to provide steady, uninterrupted water supplied at uniform temperature. Fuel can be kerosene or liquified propane or butane gas. Equipment for burning the specified fuel is furnished with the heater. Also, the heater can be furnished to burn natural, manufactured or mixed gas.

Hauck Manufacturing Co., 129 Tenth St., Brooklyn 15, N.Y.

For more details circle 121 on Enclosed Return Postal Card.

Riding Tractor

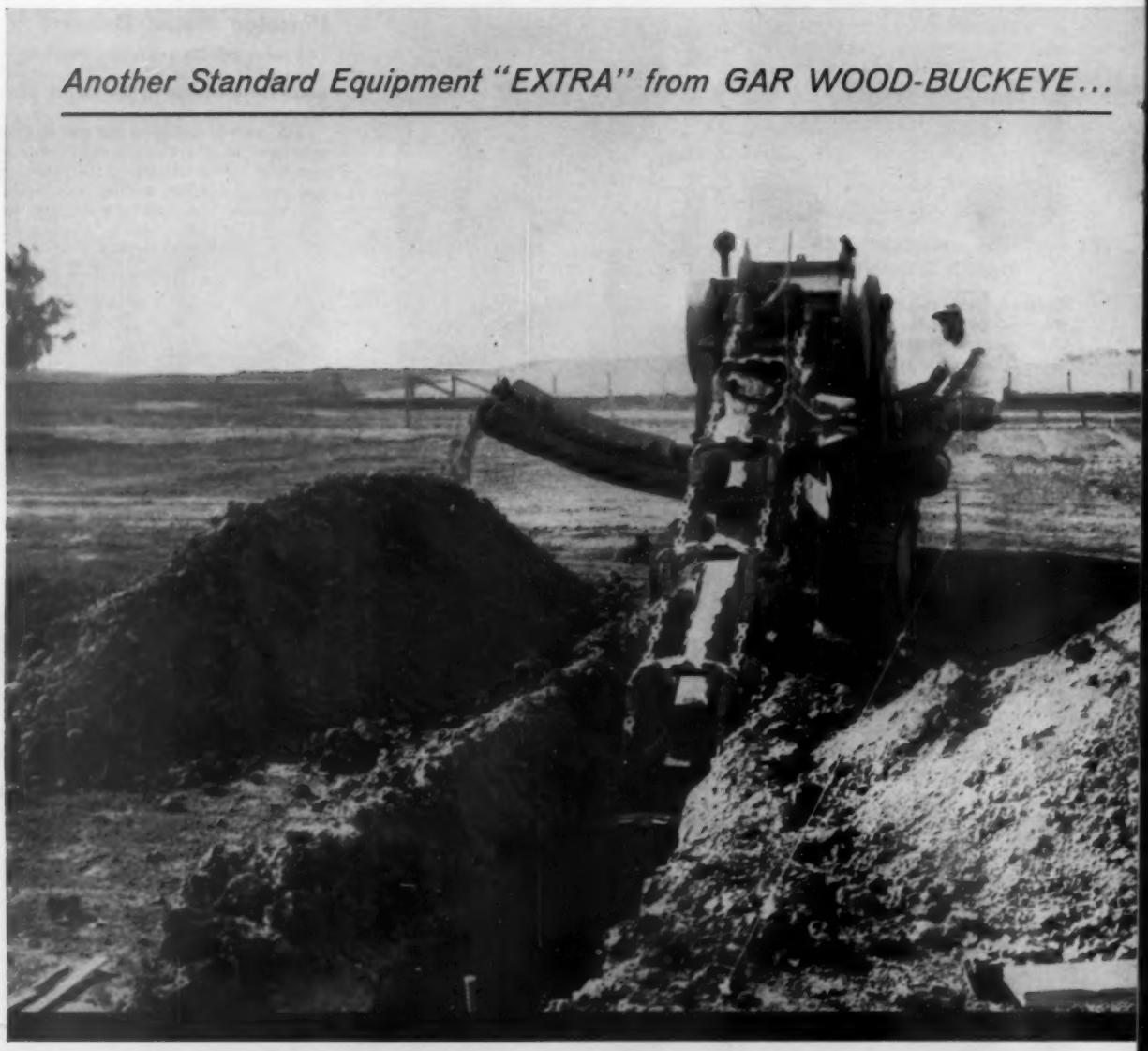
Versatility highlights the new Ride-a-matic tractor with 21 attachments, manufactured by Bolens Products Division, Food Machinery and Chemical Corp.

The tractor is equipped with a 7 hp rope starter or optional push-button electric starting kit. It has a Versa-Matic drive which can be changed to any of six forward speeds without stopping or clutching, and a safety reverse. Forward speeds range between ½ and

Ride-a-Matic with 44 in. Sickle Bar

Continued on page 182

Another Standard Equipment "EXTRA" from GAR WOOD-BUCKEYE...



GAR WOOD-ST. PAUL TRUCK EQUIPMENT, with precision hydraulics system, handles controlled dumping smoothly and quickly. It's the most complete line of arm-type, under-body and front-mounted telescopic hoists, with matching bodies.

GAR WOOD TRACTOR EQUIPMENT, matched to rugged Euclid tractors, insures trouble-free performance under the biggest loads. Equipment includes Tipdozers, Dozecasters, Rippers and front- and rear-mounted cable control units.

HI-LO
TRACTION SHIFT

Speeds Ditching...Cuts Fuel Costs

Only the Gar Wood-Buckeye 407 general utility ditcher has the exclusive Hi-Lo traction shift that permits forward or reverse digging speed to be instantly increased or reduced 50% without disengaging the main engine clutch. Hi-Lo shift simplifies speed selection, reduces fuel consumption, provides instantaneous adjustments to digging and traction conditions and simplifies matching crawler speeds to depth of cut.

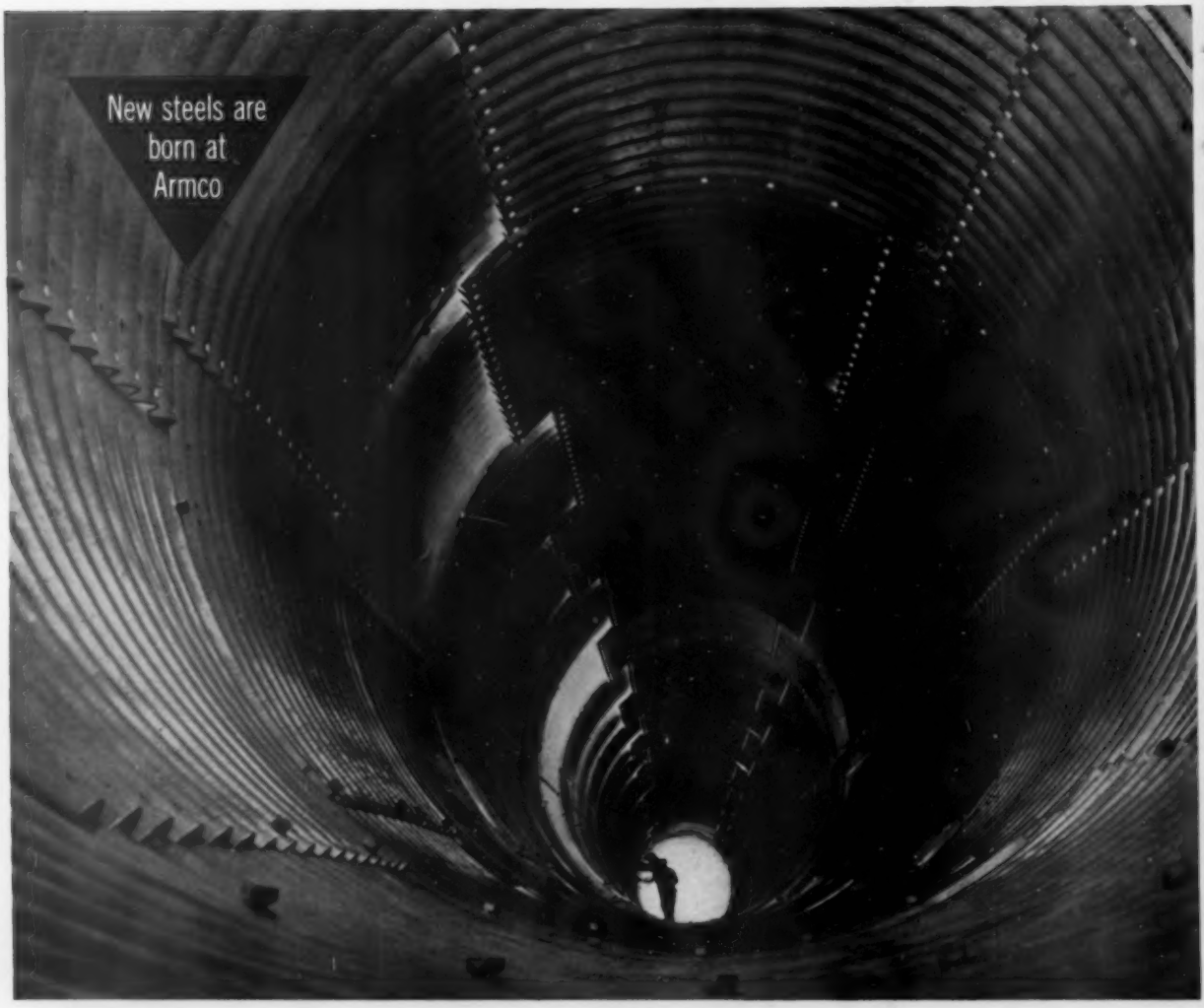
There's a long list of standard equipment "extras" your Gar Wood-Buckeye dealer can show you to prove the superior performance of the 407..."live" hydraulic boom crowd, push button conveyor shift, greater speed range without sprocket changes, two speed conveyor and non-reach grouped controls. Why not get the complete story on Gar Wood-Buckeye standard equipment "extras"...soon.

GAR WOOD TRUCK CRANES deliver a smooth flow of precision controlled power. Advanced, high-performance features let you do more kinds of jobs...faster...more accurately...at lower cost.

Gar Wood
INDUSTRIES, INC.
Findlay, Ohio • Wayne, Michigan

. . . for more details circle 321 on enclosed return postal card

THIS BIG ARMCO



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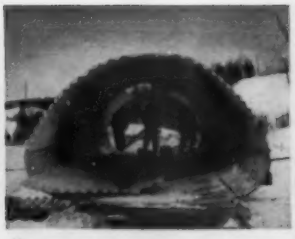
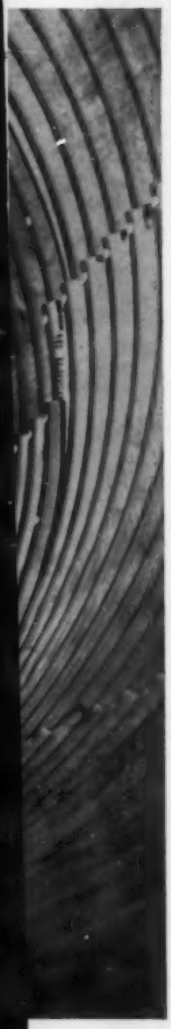


4

1. This conveyor tunnel is an Armco MULTI-PLATE Pipe. 2. Easy-to-handle MULTI-PLATE sections are bolted together quickly. 3. Battery of bituminous-coated MULTI-PLATE Structures provides large drainage area. 4. Pipe-Arch is one of a variety of shapes of MULTI-PLATE Structures. 5. MULTI-PLATE Pipe serves as pedestrian underpass in railroad yard.

DRAINAGE STRUCTURE



won't crack or break

Properly installed, an Armco MULTI-PLATE® Drainage Structure functions as a *single unit*—for good. The curved, corrugated plates are bolted together to make an integral structure. Transverse earth pressures can't disjoint it. Frost action won't crack it. Imposed loads will not break it. This means an Armco Structure will be as strong, as straight and as sound 20, 30, 40 or more years from now as the day it was installed.

Best of all, Armco MULTI-PLATE is the *most economical* answer for large size drainage structures, underpasses, conduits and similar needs, time after time. Actual job service records prove it.

You can get complete facts easily. Use the coupon for your copy of the Armco MULTI-PLATE Catalog. If you want to discuss the application of MULTI-PLATE to your specific problem, our representative will be glad to show you factual case histories. Armco Drainage & Metal Products, Inc., 4320 Curtis Street, Middletown, Ohio.

SEND FOR FREE CATALOG

TWENTY PAGES OF AUTHORITATIVE DATA

ARMCO DRAINAGE &
METAL PRODUCTS, INC.
Department I
4320 Curtis Street, Middletown, Ohio

Rush my copy of the Armco MULTI-PLATE Catalog.
☐ Have representative call.

Name_____

Title_____

Organization_____

Street or box number_____

City_____ Zone_____

State_____

Armco MULTI-PLATE Structures are part of a complete line of corrugated metal drainage structures offered by Armco. Others include Armco Corrugated Metal Pipe and Pipe-Arch, SMOOTH-FLO® Sewer Pipe, and Perforated Subdrainage Pipe. MULTI-PLATE is used where large openings are required. Diameters range from 60" to 180".

5

ARMCO DRAINAGE & METAL PRODUCTS

Subsidiary of ARMCO STEEL CORPORATION

OTHER SUBSIDIARIES AND DIVISIONS: Armco Division • Sheffield Division • The National Supply Company • The Armco International Corporation • Union Wire Rope Corporation

. . . for more details circle 278 on enclosed return postal card

New Products

Continued from page 177

6½ mph and reverse from ½ to 2 mph.

Six lawn-mower attachments offer cutting widths from 30 to 68 in. with attachments designed for installation on the rear, front or under the frame of the tractor. Fifteen other attachments includes 44 in. sickle bar, 32 in. lawn roller, 30 in. front-reel mower, 22 in. rotary tiller, 42 in. grader blade and snow plow, 58 in. center-mount rotary mower, 32 in. snow-caster, 30 in. front-mount reel mower, 3-gang center-mount rotary mower, 32 in. lawn sweeper, 28 in. lawn seeder-fertilizer and 3-gang trailing reel mower.

Bolens Products Division, Food Machinery and Chemical Corp., Port Washington, Wis.

For more details circle 122 on Enclosed Return Postal Card.

Tandem Roller

Browning Manufacturing Co. is introducing a complete new line of tandem rollers featuring this 8-12 ton model.

The new tandem contains automotive type power steering with steering wheel for fast accurate driving. Also an oversize 240 gal. water tank with large 4 in. plug for rapid filling. Gasoline or diesel engine with torque converter is offered with Revers-O-Matic single lever control on the four speeds forward and four reverse. Ballast may be easily loaded through the extra large plates on both sides of both drums. Minimum overhand reduces hand work to within 5 in. of walls. Entire rear cowling is quickly removable.

Browning 8-12 Ton Roller

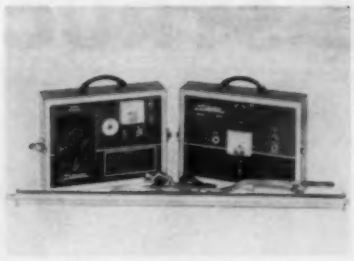
Browning Manufacturing Co., 113 Humble Ave., San Antonio, Texas.

For more details circle 123 on Enclosed Return Postal Card.

Transistorized Pipe Detector

A new transistorized pipe detector, the Detectron Model 808, is available from Computer Measurements Company.

Advantage of the transistorized unit over tube models is said to lie in the tracing pipes and cables by the conductive method. In an area of highly mineralized soil or where there are many abandoned pipe lines, the unit's cutoff is said to be sufficiently sharp to assure separate detection of pipe lines lying close together. The detector is designed also to locate valve boxes, services, studs and miscellaneous metallic objects. Depth range on 1-in. water pipes is 10 ft. and maximum depth range on large lines is 20 to 25 ft. deep depending on soil conditions.



Detectron Model 808

Computer Measurements Company, Division 6, Sylmar, Cal.

For more details circle 124 on Enclosed Return Postal Card.

Dry-Diazo Copier

The Paragon-Revolute Rockette, a new table top, dry-diazo copying machine has been announced by Paragon-Revolute, Division of Charles Bruning Company, Inc.

The unit will reproduce items up to 42 in. wide and any size in length. A single knob controls the copying speed, which can be set for a maximum of 15 linear fpm. Full development at top speed is made possible by the machine's stainless steel perforated rollers. Developer passes through these perforations and is applied across the entire print surface with maximum uniformity, thus providing high degree of print quality, the maker states. Machine operates on 200 v., single-phase, 60 cycle current.

Paragon Table-Top Copier

Paragon-Revolute Division of Charles Bruning Company, Inc., Mount Prospect, Ill.

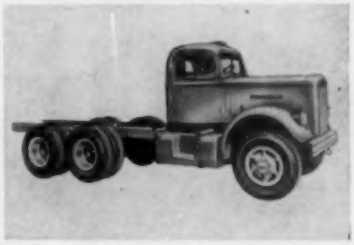
For more details circle 125 on Enclosed Return Postal Card.

Tandem Chasis

A new White medium-duty tandem chasis, available with one of the two new White flywheel power-takeoffs is announced by White Truck Division of the White Motor Company.

A new medium duty chasis (gas-powered Model 4264S or diesel-powered, Model 4264DS) is designed particularly for bridge formula states in body dump applications or in mixer operations ranging from 4 to 6 cu. yd.

The flywheel power takeoffs, belt or gear driven, are offered on the firm's complete tandem ready-mix and construction truck line. New medium duty tandem chasis is available as the 4264DS with 6-cylinder, 160-hp diesel engine and gear-drive flywheel power takeoff and as the 4264S with choice of two Super Mustang gas engines and new belt-drive flywheel pto, which provides 150 lb. of weight saving. The new trucks are designed for use with 4-to-5-yd. mixers in single channel applications and with 5-to-6-yd. mixers in double channel chasis.



White Model 4264S

White Truck Division, White Motor Company, 842 E. 79th St., Cleveland 1, Ohio.

For more details circle 126 on Enclosed Return Postal Card.

Highway Tractor Addition

The Reo Division of the White Motor Company announced recently the addition of a 90-in. bumper-to-back-of-cab series to its line of over-the-highway tractors.

Designated the series "B", it will allow Reo owners to haul 40 ft. full square trailers in states with 50-ft. overall length limits. Models in the series are the D-303, D-403, and D-503, with gross vehicle weights ranging to 33,000 lb. and gross combination weights to 55,000 lb. Standard wheelbase is 134 in., with a cab to axle dimension of 72 in. Front axle is located only 28 in.

Reo "D" Series

from the front bumper. Wide range of manual and "Reomatic" transmissions as well as several types and capacities of rear axles are available.

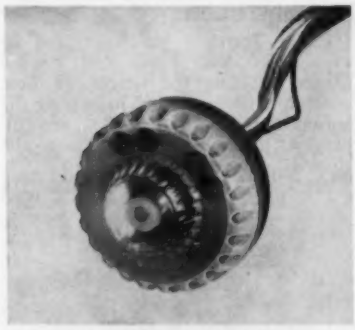
Reo Division, White Motor Company, Lansing 20, Mich.

For more details circle 127 on Enclosed Return Postal Card.

Flasher Switches

Suitable for use on passenger vehicles or trucks, the new No. 114 series switches from R. E. Dietz Company have rotary knob action that lets the driver instinctively turn the plastic knob left or right to signal turn. The switches have no handles or levers.

Switch knob has four pilot lights: two green for turn signaling and two red for emergency warning signaling. Push button permits knob to be turned



Dietz No. 114 Switches

completely right or left for emergency warning signaling, when all four turn signals flash simultaneously. Switch ordinarily mounts on dash board, but for mounting on steering column, No. 116 steering column clamp and bracket are available. No. 114 series switches are available in seven or four wire models. Seven wire switch allows rear turn signals also to function as stop lights.

R. E. Dietz Company, 225 Wilkinson St., Syracuse 1, New York.

For more details circle 128 on Enclosed Return Postal Card.

Precision Transit

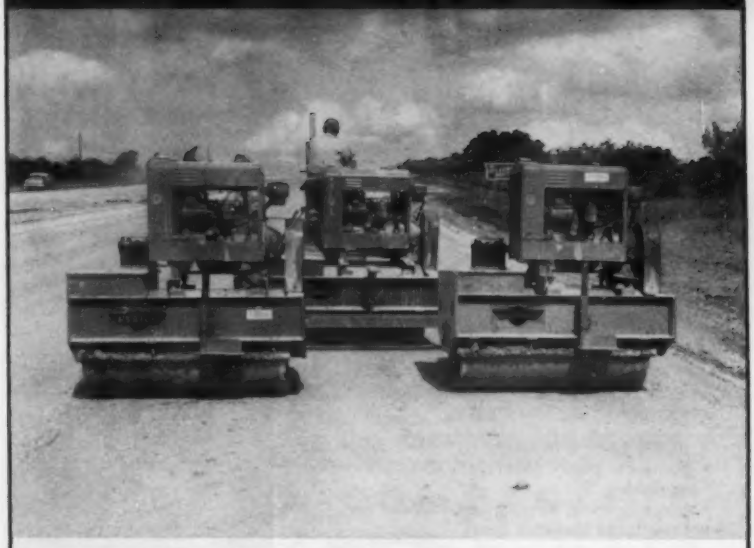
Availability of a precision 6¼-in. transit has been announced by Umeco Optical Division.

The instrument weighs 16½ lb. and

Umeco's 6¼-in. transit

ESSICK

VIBRATING COMPACTORS



COSTS DOWN—COMPACTION UP!

WITH ESSICK 54" VIBRATING COMPACTOR

CONTRACTOR REPLACES EQUIPMENT WORTH $67,200 AND DOUBLES PRODUCTION RATE—WITH HIGHER DENSITIES—FEWER PASSES—HIGHER LIFTS

On Texas State Highway 180, Fred Hall & Sons Contractor, were using two Model M tractors, three 10 ton pneumatics, one 3 wheel 10 ton roller, one 50 ton self propelled pneumatic, and one blade to compact crushed limestone with four different clay contents varying from 10% to 15%. They were having considerable trouble getting densities with 2" lifts and many passes of the 10 ton pneumatics, the 50 ton pneumatic on the third lift of 6", and a slushing and final rolling with the three wheel roller to slick off.

Three Essick VR-54 (54") Vibrating Compactors in triplex hook-up made two passes on the full six inch lift, with one more fast pass after a water slush to slick off. They got the required density of 140 pounds to the cubic foot, and increased material laid to twice the amount laid before. The three 54" Vibrating Compactors in triplex replaced $67,200 worth of other equipment—reduced operating costs—and doubled the rate of production.

ESSICK VIBRATING COMPACTORS

In any compaction requirement, ESSICK High-Frequency Vibrating Compactors will cut costs, increase production with higher lifts, fewer passes, higher densities, at a greater profit. ESSICK Vibrating Compactors are constantly increasing the profit of thousands of contractors like Fred Hall & Sons and can do the same for you.

9 models of Vibrating Compactors from 13" to 72" widths

for compacting all types of fills, sub base, base materials, asphalt and trenches

Also 14 Models of Tandem Rollers from ½ to 14 Tons.

SEE YOUR ESSICK DEALER FOR A DEMONSTRATION ON YOUR JOB

ESSICK MANUFACTURING COMPANY

1950 Santa Fe Avenue, Los Angeles 21, California

850 Woodruff Lane, Elizabeth, New Jersey

Affiliated with THE T. L. SMITH CO., Milwaukee, Wisconsin

. . . for more details circle 309 on enclosed return postal card

ON THE JOB
. . . ON THE TOUGHEST JOBS
ARCTIC BOY
portable water coolers

. . . built to take a beating on construction jobs, in mines, on the farm, railroad crews, on service trucks . . . wherever men work and the going is rough.

They keep drinking water cool and sanitary, keep worker efficiency up. And note these features:

- HOT DIPPED Galvanized or stainless steel insets
- Sparkleen plastic liner . . . non toxic, prevents corrosion
- Large opening, easy to ice and clean
- Extra large insulation space

Send for free booklet "Care and Use of Your Cooler." Write Dept. No. C-6

Deluxe

SCHLUETER MFG. CO. **St. Louis, Mo.**

. . . for more details circle 382 on enclosed return postal card

New Jay Tampers cut compaction costs

Now you can tamp harder, faster, better on all soils and blacktop. Also handle, maintain and transport easier. All 3 Jay models have stepped-up power, new plate contours, new handle, improved air cleaner and mounting, and transportation unit *(right)*. Years ahead of other tamping machines or methods, reduce compaction costs as much as 95%. See your Jay dealer for free demonstration or send for new Catalog J-O. Jay Division, J. Leukart Machine Co., Inc., 2228 S. 3rd St., Columbus 7, O.

JAY tampers

. . . for more details circle 345 on enclosed return postal card

New Products

has an erecting, 28 power, 11½-in. telescope with coated lenses, resolving 3.5 seconds of arc. The 44 mm objective provides a brilliant image, the marketer states. Horizontal circle is 6¼-in. in diameter with graduations reading direct to 20 minutes, double numbered 0-360 and 360-0, with figures inclined in direction of increase. Verniers read down to 20 seconds. Vertical circle is 5-in. diameter graduated to 30 minutes with a vernier direct reading to one minute. A choice of tripods is available.

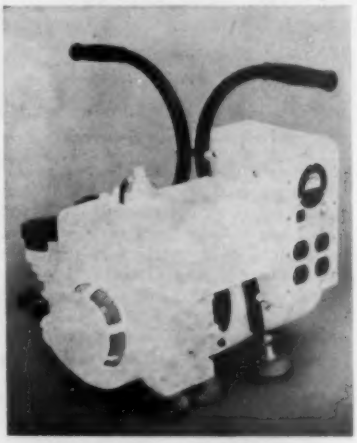
Umeco Optical Division, 465 California St., San Francisco 4, Cal.

For more details circle 129 on Enclosed Return Postal Card.

Electric Plants

Pacific Mercury has redesigned its 1750, 2,000 and 2,500 watt electric plants, reducing the weight of these generators by 25 lb. and increasing the horsepower from 10 to 15 percent. Largest portable electric plant, the 2,500 w. model weighs only 110 lb.

All three plants have as standard



P M's New Electric Plants

equipment, six receptacles for multiple operation of power tools and other equipment, electric start, hi-lo battery charge on all AC models, rpm indicator and cast aluminum skids. Shock-absorbing skids are also available.

Pacific Mercury, Marketing Division, 13232 Leadwell, North Hollywood, Calif.

For more details circle 130 on Enclosed Return Postal Card.

Highway Tractors

A new line of compact-design, diesel powered highway tractors that offers significant reductions in chasis weights has been announced by International Harvester Export Company.

Offered in four and six-wheel design with gross combination weight ratings from 61,000 to 79,000 lb., the new BC-D line tractors have a 90-in.

International Highway Tractors

bumper-to-back-of-cab dimension. Weight reductions and improved load distribution enable standard BC-D models to haul more than 800 lb. additional payload than previous models, the maker states. Features include a forward-mounted PTO pump for underhood serviceabilty, relocated air compressor and aluminum steering gear and lift-out radiator core.

Cummins NH-195 and NH-200 diesel engines are available for BC-D line models, as is a wide range of transmissions, axles and wheelbases.

International Harvester Export Company, 180 N. Michigan Ave., Chicago 1, Ill.

For more details circle 131 on Enclosed Return Postal Card.

Distance Measuring Unit

A completely re-designed model of the Tellurometer System for measuring distance has been announced by Tellurometer, Inc.

Major refinements of the new unit include: Units that are interchangeable; each can be used as master or remote. Built-in radio communications, redesigned and furnished with a light-

Tellurometer Improved Model

weight headset. A separate, transistorized power pack built into the instrument itself. The separate steel carrying case has been eliminated, and the unit is self-contained. Size has been reduced to 14 in. by 10½ in. by 10½ in., and the weight reduced to less than 30 lb.

Tellurometer, Inc., 224 DuPont Circle Bldg., Washington 6, D.C.

For more details circle 132 on Enclosed Return Postal Card.

ESSICK

VIBRATING COMPACTORS

ESSICK VR 72 ON FREEWAY INTERCHANGE

BACKFILL COMPACTION COSTS CUT IN HALF

"On part of this job involving a tremendous backfilling project of more than a dozen bridges, I would estimate," says Jack Yount, "that by using the VR-72 we doubled our production and cut our compaction costs by at least one-half."

TOUGH FILL EASILY REACHES DENSITY IN 1 TO 3 PASSES

Jack Yount, Vice-president and General Manager of Vinnell Constructors states: "We really had a problem when we started compaction operations on the interchange of the new Golden State and San Bernardino freeways. The fill soil was composed of oil shale, a lightweight, light colored shale and black organic material, and in addition, moisture content was 10-15% over optimum. After many passes and long hours of rework, a Sheepsfoot roller reached density requirements calling for 90% on a modified AASHO test.

"We had successfully used our company-owned Essick VR-54-T compactors in the past, but for this particular fill we chose their larger model VR-72-T. Used in conjunction with the Sheepsfoot Roller (to break up the clods), the Essick 72" vibrator brought the solid density to well above California State Requirements in from 1 to 3 passes.

There is an Essick Vibrating Compactor especially designed to solve your particular compaction problems. The contractor who must achieve higher densities, meet rigid compaction costs and still make every equipment dollar count, relies on ESSICK.

9 models of Vibrating Compactors from 13" to 72" widths

for compacting all types of fills sub base base materials asphalt and trenches

ALSO 14 MODELS OF TANDEM ROLLERS FROM 1/2 TO 14 TONS

ESSICK MANUFACTURING COMPANY

1950 Santa Fe Avenue
Los Angeles 21, California

850 Woodruff Lane
Elizabeth, New Jersey

Affiliated with THE T. L. SMITH CO., Milwaukee, Wisconsin

. . . for more details circle 310 on enclosed return postal card

New Products

Ditching Attachments

Complete "one-step ditching" possible with two new Ulmac attachments for Caterpillar motors graders, according to an announcement made by Ulmac Equipment Co., Inc.

Ditches are cut in one pass with the new Ulmac U-200 Disc-beam attachment. The scientifically-curved cutting disc is fastened to the motor grader by an all-welded box beam, and is controlled by the standard motor grader scarifier contols. The curved disc cuts the material and directs it,

Ulmac Attachments at Work

with a live rolling action, to the motor grader blade. Material removed from the newly-cut ditch and shoulder is moved to the roadway in a continuous windrow by the angled grader blade. Attached to the motor grader, through a swinging offset hitch, is the Ulmac U-300 motor grader loader. The offset hitch design permits the U-300 loader to be centered on the windrow formed by the grader blade and allows hauling units to follow and load on the roadbed.

Ulmac Equipment Co., Inc., El Paso, Ill.

For more details circle 133 on Enclosed Return Postal Card.

. . . for more details circle 317 on enclosed return postal card

Six-Wheel-Drive Truck

A new six-wheel-drive Autocar, with 45,000-lb. GVW and 6½ cu.yd. mixer was introduced recently by the Autocar Division of White Motor Company.

The Model C5566 is a 6 x 6 truck designed to provide maximum traction for full-load mixer operations in all terrain and weather conditions. Standard specifications include an 11-000-lb. capacity front driving/steering axle, 170-

White C5566 Autocar

hp Super Mustang gasoline engine, five-speed engine, two speed transfer case with ratios of 1.00 to 1 and 2.48 to 1, and a 34,000-lb. capacity double reduction tandem rear axle equipped with interaxle differential and power-operated lockout. A package of optional components will increase the C5566's gvw to 50,000 lb.

Autocar Division, The White Motor Car Company, Exton, Pa.

For more details circle 134 on Enclosed Return Postal Card.

Fencing-Posting Machine

A machine that makes the erection of a wire fence a "one-pass operation" for a two-man crew has been developed by U.S. Steel in cooperation with its American Steel and Wire Division.

With this unit, posts are driven into place rather than inserted into specially dug holes. As the tractor and fence erector are driven ahead to the next post location, woven wire fence or woven wire and a strand of barbed wire are

U. S. Steel Fencing Machine

paid out vertically. Where barbed wire only is needed, as many as five strands can be dispensed. Then three or four posts are driven, a hydraulically operated clamping mechanism holds the wire for stretching. The unit is driven forward for the proper tension, and fencing is attached to the posts.

The unit can straddle a straight line when both fencing and posts are being erected at the same time, or it can be adjusted so that tractor and equipment can operate adjacent to a line of existing posts. End and corner post assembly is possible.

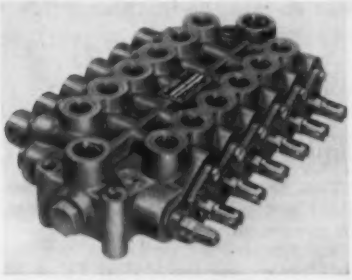
United States Steel Corporation, 525 William Penn Pl., Pittsburgh, Pa.

For more details circle 135 on Enclosed Return Postal Card.

Control Valve

Hydreco Division of the New York Air Brake Company has released a new hydraulic control valve with parallel internal circuit designed for tractor mounted backhoes and other heavy duty mobile equipment where rapid sequence of multiptle functions is required.

The new V-33 Series valve is available in two, three, four and six plunger models, recommended for 20 gpm at 2,000 psi. The V-33 valve is a complete fluid power circuit with all required or extra circuit features built into a single compact package.



Hydreco V-33 Series Valves

The valves may be furnished with built-in pilot operated overload relief valves on individual cylinder circuits as required. These prevent damage from high static pressure that may be developed in a blocked cylinder circuit, the maker states. Operating plungers may also be provided with built-in swing cushioning valves from boom control or built-in flow control and counterbalance valve.

Hydreco Division, The New York Air Brake Company, Kalamazoo, Mich.

For more details circle 136 on Enclosed Return Postal Card.

Sectionalized Belt Conveyors

Standardized sectional belt conveyors are available for the continuous handling of sand and aggregates from Chain Belt Company.

Head and foot sections are reported to be perfectly aligned and ready for bolting to intermediate sections. Intermediate sections are available in either 24 or 42-in. truss depths. Truss lengths come in 6, 9 and 21-ft. sections that are

Rex "Off-the-Shelf" Belt

TWO MORE CONTRACTORS PROFIT FROM

DOTMAR

CURB & GUTTER PAVERS

Schuster Construction Co., Green Bay, Wis., cuts costs with a Dotmar, paving median strip curbing on U.S. 41 near Neenah, Wis. at better than 300 ft. per hour. Machine does not hold up ready-mix trucks. Makes curb or gutter of any shape—sidewalks too, highway median strips and city street widening with curb to 6 ft. wide.

M. G. Monte Contracting Co., Mt. Clemens, Mich., keeps ahead of schedule paving curb and gutter on Detroit Expressways and State Highway projects. Dotmars quickly return their cost.

Send for literature!

MAKERS OF MAGNALITE MAGNESIUM ALLOY PAVING FORMS

Dotmar INDUSTRIES Inc.

501 Hanselman Bldg., Kalamazoo, Mich.

. . . for more details circle 306 on enclosed return postal card

LOOK TO FLINTKOTE FOR ALL YOUR PAVEMENT SEALING AND REPAIR PRODUCTS . . .

Send today for technical data sheets on the following:

● **FLINTSEAL***—hot poured rubber asphalt compound—tough, long lasting . . . bonds perfectly through cycles of slab expansion and contraction.

● **H-100**—Super effective, polymer type joint sealer (cold applied)—oil and chemical resistant; sets quickly, bonds perfectly at extreme temperatures. *No flow*—even in vertical joints. Ideal for sealing bridges.

● **FLINTAR***—Coal Tar Pitch Emulsion (brush or squeegee applied)—doubles the life of bituminous pavement by protecting against moisture infiltration and oxidation. Beautifies too!

● **FLINTCRETE†**—Exciting new polysulfide/epoxy cement bonding compound. In several formulations for pavement restoration and repair.

Also ask about Flintkote's hot poured and Cold-applied Jet Fuel Resistant Joint Sealers. Complete pavement restoration specifications are available. Write: The Flintkote Company, P. O. Box 157, Whippany, New Jersey.

*Reg. U. S. Pat. Off.

†A trademark of The Flintkote Company

FLINTKOTE

Manufacturer of diversified products for home and industry

. . . for more details circle 314 on enclosed return postal card

what's in a
new
name ?

The old was Seaman-Andwall Corporation, Division of American-Marietta Company. The New? **American-Marietta Company, Construction Equipment Division!**

The new name means **NEW** and better rotary mixers for the road builders . . . **NEW** compaction equipment . . . **NEW** developments through greater research.

The new name means **NEW STANDARDS** in soil stabilization and compaction equipment through closer association of the Construction Equipment Division with other A-M producers of cement; admixtures for concrete; precast, prestressed and pretensioned beams; precast pipe, and similar construction materials well-known to the construction industry!

This is a new name worth looking into!

A-M

AMERICAN-MARIETTA COMPANY

CONSTRUCTION EQUIPMENT DIVISION

MILWAUKEE 1, WISCONSIN

New Products

42 in. deep. Using these matched sections, conveyor systems of virtually any length can be constructed.

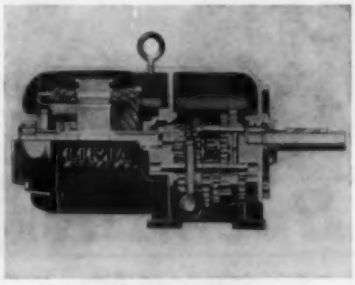
Chain Belt Company, 4701 W. Greenfield Ave., Milwaukee 1, Wis.

For more details circle 137 on Enclosed Return Postal Card.

Selective Speed Drive

Redesigned internally, the Lima Type R3 selective 4 or 8 speed gearshift drive is now available for mounting in any position required, states the manufacturer, Lima Electric Motor Company, Inc., a subsidiary of Consolidated Diesel Electric Corp.

In addition to meeting qualifications for mounting positions, design changes include stress-proof steel shafting in the motor and in the gear box, with hardened splines, is furnished with stand-



Lima Type R3 Drive

ard single-speed motors of 1,880, 1,200 or 900 rpm. Horsepower ratings of 1, 1½, 2, 3 and 5. Two speed motors are available. Gear ratio is: Low, 4.15:1, 2nd, 3.15:1; 3rd, 1.85:1 and high 1.00:1. Output speed selection is according to motor input rpm. Drives are furnished to operate on standard 208, 220/440 or 550 V., 3 or 2 phase, 60 cycle current supplies.

Sales Promotion Dept., The Lima Electric Motor Co., Inc., Dept. 208, Lima, Ohio.

For more details circle 138 on Enclosed Return Postal Card.

Small Asphalt Patcher

"Hot Witch" Roller, the small asphalt pavement patching device, is the latest product announced by Charles Machine Works, Inc.

The unit uses the principle of heat in applying patches in asphalt paving, both hot and cold mix. It consists of a heavy roller inside which is a propane-fired heater capable of heating the roller to a temperature of 800 deg. in four minutes time. The device is propelled by hand. A 20 lb. bottle of propane is mounted on top of the machine and provides 6 to 8 hours of fuel for heating the roller. Unit will smooth patch spots, seal surface and bond patch to the surrounding area, all requiring no particular skill on the part of the operator.

"Hot Witch" Patcher

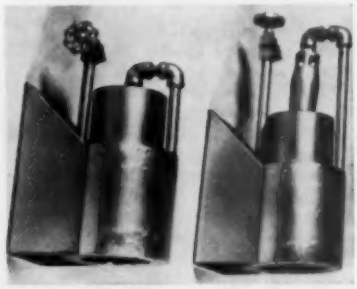
Witch Marketing Company, 1959 West Fir Ave., Perry, Okla.

For more details circle 139 on Enclosed Return Postal Card.

Liquid LP Gas Burners

Two new LP gas burners have been added to the line of Wemco Products gas equipment.

The burners, for tar kettles, asphalt machines etc. are the Models TK-40-A,



Wemco Gas Burners

rated at 1,250,000 Btu's at 30 lb. pressure, and Model TK-150-A, rated at 2,000,000 Btu's at 30 lb. pressure. Also, the Model Tk-10, a large vapor gas burner, is now available.

Wemco Products, 733 E. Nine Mile Rd., Hazel Park, Mich.

For more details circle 140 on Enclosed Return Postal Card.

Safety Headgear

An expansion of safety products with the addition of a complete line of safety hats and caps is announced by Bausch & Lomb Optical Co.

Contour fit suspension has been achieved in the hats through the use of pliable polyethylene. The hats are reported to conform to the head without giving a top-heavy feeling. Lock straps assure clearance of 1¼ in. which can be increased if necessary. Numbered snap-in adjustment provides quick fitting to any head size from 6⅝ to 8. The headgear is available in a choice of fibreglass, aluminum and plastic, covering a full range of colors.

Bausch & Lomb Optical Co., Rochester 2, N.Y.

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. . . for more details circle 284 on enclosed return postal card

ROAD-ON-A-RAFT

Continued from page 117

dence of waving or uneven consolidation.

Contractor for the Weeks Island-Florence project was Campbell Construction Co., Inc., of Shreveport, La. E. H. Mackey was general superintendent. Project engineers for the Louisiana Highway Department were J. C. Stephenson and Larry Lucas, with J. L. Stewart chief inspector.

The construction of this project was under the supervision of the Lafayette District Office, J. E. Jarman, district engineer and W. E. Robert, assistant district engineer. The 5.5 mile project was bid at $797,513.

Typical Laboratory Analysis

For soils to be stabilized with lime in the Louisiana project

MECHANICAL ANALYSIS

	Per cent
Coarse Sand	1
Fine Sand	15
Silt	66
Clay & Colloids	18
Pass No. 40 Sieve	99
Pass No. 200 Sieve	96
Pass No. 270 Sieve	88

PHYSICAL CHARACTERISTICS

Liquid Limit	38
Plastic Limit	26
Plasticity Index	12
Shrinkage Limit	15.98
Shrinkage Ratio	1.80

CLASSIFICATION

Group	A-4
Classification	Silty Loam

During period of this project the Louisiana department of highways was using a method of determining grain size which differed from the AASHO standard test method. The dispersing agent used was sodium silicate and sand, a material considered to be 0.050 mm. and larger. The physical characteristics were determined by utilizing the Dry Preparation of soils.

THE AUTOMOBILE is the leading passenger transporter in the United States, handling 89% of all intercity travel, according to "Automobile Facts & Figures", published by the Automobile Manufacturers Association.

Here's what it takes to build good roads faster, cheaper

Right from the job site comes this true story of how one contractor who specializes in soil-cement reclaimed an old blacktop road in Arizona, paved a mile and a half a day to carry heavy truck traffic. Key units in his equipment spread were three TRAV-L-PLANTS.

These self-propelled mixers handled all the dry blending of cement and base material, then precisely metered the correct proportion of water on the final pass. Final compaction was accomplished with two 5620 Pneumatic Compactors operating in tandem.

The complete on-the-job report of this project is available free. Reprinted from a well-known construction magazine, it tells all about the techniques and equipment used, shows why the A-M equipment line is first choice of expert road builders everywhere. Write for your free copy today.

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AMERICAN-MARIETTA COMPANY, Construction Equipment Division
Milwaukee 1, Wisconsin

Send my free copy of the job report, "Update a Road the Simple, Less Costly Way." ☐ I'd also like to have a salesman call. ☐

Name _____ Title _____

Firm _____

Address _____

City _____ State _____

A·M AMERICAN-MARIETTA COMPANY
CONSTRUCTION EQUIPMENT DIVISION

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Bituminous Plant Experts Get Down to Job Specifics

Bituminous
Roads And Streets

Sometimes it takes the manufacturers' experts to make a practical sum-up on highway equipment selection and use.

Contractor listeners hit the jackpot in this respect at the recent Detroit meeting of the National Bituminus Contractors Association. The occasion was an all-afternoon panel session on "Manufacturer, Production and Laying of Bituminous Concrete Pavements." The session yielded many points of vital interest to the contractors who filled the big room.

Planned as part of the how-best-to-do-it, "workshop" atmosphere of the convention, the session was presided over by Edward T. Perry of New Haven Traprock Co., an NBCA director, in the absence of Vice president F. C. Leffingwell. The panel was MC'd by H. A. Radzikowski, chief, Division of Devel-

Manufacturers' panel at Detroit (front table): W. V. Davidson of Standard Steel Corporation (Mr. Preeman of this firm is not in picture); W. L. Hindermann; The Asphalt Institute; Hans Held, The Ducon Company; Robert J. Marshall, Dust Suppression & Engineering Co.; Dick Bartell, Iowa Mfg. Co.; (speaking) Chairman Edward T. Perry, NBCA director; Moderator H. A. Radzikowski, Bureau of Public Roads; H. A. Barber, Barber-Greene Co.; E. Sterling Brent, Littleford Bros., Inc.; Joe McCoy, E. D. Etnyre & Co.; Don Palmer, Jr., Pioneer Engineering Div., Poor & Co., Inc.; Fred W. Kimble, Ohio Department of Highways. Panel consultants glimpsed at the rear table are variously quoted in the accompanying report.

opment, Bureau of Public Roads. The topics included aggregate stockpiling and feeding, pavement rolling and eight other items between.

The detailed proceedings of the informally handled Detroit meeting, combined with data from the manufacturer panel meeting a year ago at NBCA's Miami Convention, will be made available eventually by the Association. Meanwhile, the following notes by the *Roads and Streets* Editors cover some of the significant details brought out.

Aggregate Stockpiling, Feeding and Drying. The panelist on this subject was M. B. Preeman, Standard Steel Corporation. His remarks are quoted in part:

"Stockpiling, feeding and drying constitute a very large part of asphalt plant operation and in many ways are considered its heart.

"Stockpiling is pretty much a matter of meeting the needs of the situation; i.e., adapting the ground layout to the method of transporting the incoming aggregates and to the type of equipment being used for moving the aggregates.

"Feeder bins and feeders, again in many cases, are largely designed to the customer's particular layout; although in some cases some manufacturers are now furnishing standardized feeder bins and feeders along with the asphalt plants.

"Drying is not a complicated process since it just means the exposure of a mass of aggregates to heated air over a period of time. It consists of three elements: (1) cascading the aggregates by mechanical action; (2) application of heat from the dryer burner and (3) application of draft by the induced air system.

"We, the plant manufacturers, are, however, faced with the problem of building a standardized piece of equipment which will take care of a great many variables. These variables include a wide difference in types of aggregates in addition to a very marked variation in moisture content in certain areas of the country.

"Added to this, is the varying degree of moisture content of the dried material, which has been set up by certain states in their bituminous concrete specifications.

"Also, some of us manufacturers are shipping plants overseas where the drying problems will, in many cases, vary from ours here in the states.

"All the manufacturers need to standardize yet keep within the range of the customer's pocketbook.

Continued on page 193

Dragline gets inspection from Keith Hutchison, Greer vice president and technical director, Phil Owen and Chuck Daub (l. to r.). Owen and Daub are Standard Oil lubrication specialists who render the school technical assistance on lubrication problems. Both have engineering degrees and both have completed Standard's Sales Engineering School. Daub has ten, Owen five years of field experience serving commercial customers.

Standard Oil helps this school teach men how to keep a construction job going

Greer Excavating and Mechanics School has learned one of the lessons it teaches — how to keep equipment in service

Situation: Time is money at Greer Excavating and Mechanics School, Braidwood, Illinois. The school promises its students hours of experience operating equipment. It teaches them how to maintain and service the machinery they work with.

Up to 70 students, guided by nine experienced instructors, work 26 pieces of equipment almost every daylight hour, seven days a week, winter and summer.

What was done: From the first day of school more than three years ago, Greer Institute's equipment has been serviced exclusively with Standard Oil gasoline, diesel fuel, motor oil and greases. Phil Owen, an experienced Standard Oil lubrication specialist from Joliet, just 20 miles from the school, makes regular calls to check out any lubrication problem. From Wilmington, only 5 miles away, Standard Oil agent R. J. Kavanagh makes deliveries of gasoline, diesel fuel, lube oil and grease as often as every other day.

What you can do: To get this kind of service call the Standard Oil office near you in any of the 15 Midwest or Rocky Mountain states. Or write, **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

You expect more from **STANDARD** *and you get it!*

Plenty of dirt to work with. School site is on 1,700 acre tract that has been ripped, torn and piled as result of strip mining. Here student is learning how to operate skid shovel.

DETROIT NBCH MEETING

Continued from page 191

We in the industry, however, feel that we have made great progress in doing just the above and we are going forward all the time with new developments to increase drying production and reducing costs."

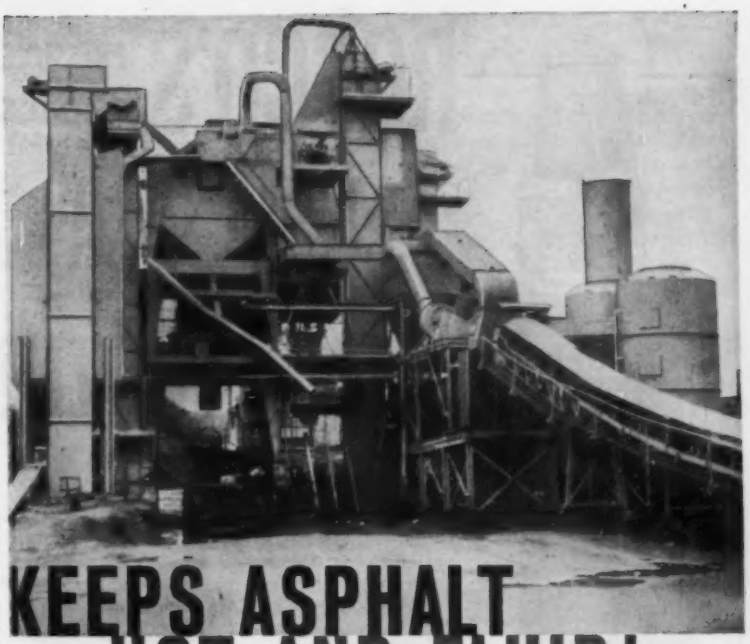
Mr. Preeman covered several specific problems. One that affects quality of mix is how to keep fines from being overheated, while coarse aggregate at the same time may be underheated. Preeman urged plenty of fan capacity for any dryer, particularly where considerable moisture must be carried away as either steam or vapor.

Another consultant, Percy Todd, The Simplicity System Co., added ideas on aggregate drying. He observed that various manufacturers differ in their basic approach, whether it is best to step up drying by inducing more air, showering the material through the gasses more actively, or increasing gas temperature. However, equipment makers seem more in agreement today that material should be kept in contact with hot gases as long as possible to achieve economic drying.

The fact that plant owners must work with materials of higher moisture content today was a problem noted by panel consultant C. R. Hopkins, of General Combustion Equipment Co. Heavier grades of fuel oil are now common, and these two factors together have affected burner design.

Hopkins also discussed automatic controls for burners and plants. Pneumatic and electric controls both do a good job, and represent much development work by the manufacturer to give the owners better control of aggregate temperatures.

A Virginia contractor queried the experts on justification of his state's new requirement of laminated or layered aggregate stockpiles. Virginia also now requires stockpiling stone rather than delivering directly into the plant on state road work. Panel consultant Arthur Clay, of Hetherington & Berner, Inc., in answering said that a categorical "yes" or "no" on this requirement is not possible. The main concern, he said, should be over controlling aggregate components. If a component has a maxi-



KEEPS ASPHALT HOT AND FLUID!

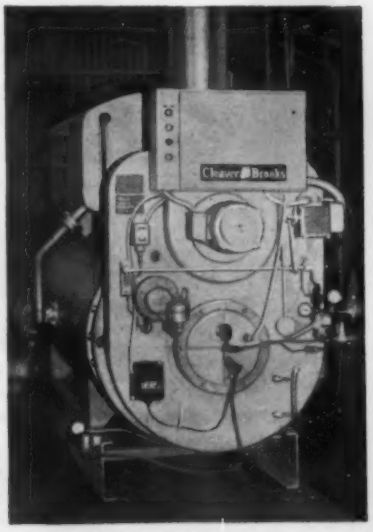
Cleaver-Brooks Peak-Temp oil heater proves to Sowerbutt Asphalt Inc. that keeping asphalt hot at 325° F is easy and profitable year around.

Here's what Jim Fulmer, superintendent of Sowerbutt Asphalt Inc., Paterson, N. J., said recently about his 1,200,000 btu Cleaver-Brooks Peak-Temp oil heater: "We supply upwards of 50,000 tons of asphalt mix a year for state, county, and local governments and for contractors in the area. Our Peak-Temp oil heater heats asphalt in 20,000 gallon storage tanks and heats jacketed lines from the tanks. It's operated night and day seven days a week, winter and summer. We just check the heater occasionally. This is the kind of reliability in equipment we want."

No water or steam problems with Peak-Temp oil heater, either. High flash point heat transfer oils circulate, raise and maintain asphalt temperatures faster than steam. And Peak-Temp oil heater's forced circulation design prevents hot spots, assures long operating life.

This versatile heater speeds curing of concrete used in precast and prestressed structural members. Easily adapted to controlled heating of plastics and residuals.

For full information on Peak-Temp oil heater write Cleaver-Brooks Company, Dept. D, 395 East Keefe Avenue, Milwaukee 12, Wisconsin.



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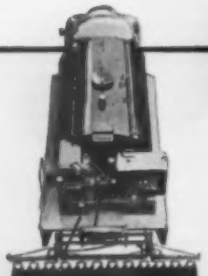

ROSCO'S PRESSURE METERING MAKES THE DIFFERENCE AT ANY WIDTH!

Do you know . . .

that it's possible to apply bitumen through any length of spraybar from 1 to 24 feet *without changing the pressure and without any application adjustment?* It can be done with a Rosco! You would normally expect surges or drops in pressure to occur when sections of a distributor's spraybar are shut-off or turned on.

But . . .

NOT with a Rosco Distributor equipped with exclusive Pressure Metering. Even when as much as 23 feet of a 24-foot spraybar are shut-off, the precise, accurate delivery remains unaffected . . . the pressure in the working one foot stays the same as it was pre-set at the beginning of the run. The accurate delivery from the working nozzles is not affected . . . no matter how many feet of the bar are cut out.

No adjustments in truck or pump speed are required—in fact, with Pressure Metering the pump speed never changes and normal wear of the pump never affects the accuracy of the application. When any part of the spraybar is shut off, the excess material is automatically by-passed. Pressure at the operating nozzles stays the same. When additional nozzles are turned on, pressure is immediately available to supply them.

One control sets the pressure specified for the job. After that, pressure control is automatic . . . the operator can concentrate full attention to spotting the material properly on the road. Pressure Metering is an integral part of Rosco's patented Master Valve that permits one-lever control of all normal distributor functions. You'll find that Rosco's Pressure Metering is faster and more accurate —factors which can be the difference between a "make" or "break" job in today's highly competitive field. And Rosco's Pressure Metering assures you of jobs that will always meet rigid application specifications.

Let your Rosco dealer show you how Pressure Metering will pay off for you. Or write the factory for descriptive literature with specifications on Pressure Metering-equipped Distributors.

ROSCO BITUMINOUS DISTRIBUTOR with Pressure Metering. Front or rear mounted for truck or trailer.

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DISTRIBUTORS • MAINTAINERS • BROOMS
SUPPLY TANKS • TAR KETTLES • STREET FLUSHERS

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mum particle size of range of two to one, layering is desirable to avoid segregation. For less range, this may not be justified.

Storing and Heating of Bitumen. W. L. Hindermann, The Asphalt Institute, St. Paul, reminded the audience that temperature control is one of the most important considerations throughout bituminous work. It affects pumpability, mixing time, mix properties, finishing and rolling, and also long-time durability of the pavement. He stressed repeatedly the importance of keeping aware of the fundamental relationship between temperature and viscosity, which is not necessarily the same for all asphalts of the same penetration grade. He urged a re-reading of the Institute's recommendations on this subject, issued some months ago.

In storing and heating bitumen, Hindermann said that the fine points of control are often overlooked or neglected. It is important to insure continuous circulation between storage tanks and plant during operation.

Whether to heat with steam, hot oil or electricity was a question brought up from the audience. Wm. J. Miller of Hy-Way Heat Systems, Inc., enumerated the pros and cons of the three methods: steam requires no outside power source, but is limited to about 340 or 350 deg. F (125 psi pressure), which may be too low for some purposes; also requires a licensed engineer, and brings problems of boiler scale, corrosion, etc. Hot oil which came into popularity in the past 13 years can go up to as high as 600 deg. using a mineral based heating oil with no pressure above atmospheric.

Electric heating, noted this authority, has come into acceptance most often where the plant handles a nearly constant, uniform tonnage over a considerable part of the year (say 500 to 600 tons daily over 8 to 10 months). A drawback in some areas is the high kw cost. Also its economic advantage is often offset if heat must be maintained for lengthy periods without production, or if frequent complete cooldowns are necessary. Getting large tanks back to heat is costly.

Dust Collection. Alex Kostyzak, Madsen Works, Baldwin-Lima-Hamilton Corporation, compared

different types of dust collectors, enumerating factors which affect the choice for a given installation. The stationary round cyclone type installation usually takes longer to erect but is more efficient than a smaller portable setup of the multiple cyclone type, was this manufacturer's viewpoint. This, said the Madsen leader, is because of the slower air velocities of the larger unit, which makes for more efficient dust collection and less wear. A 12-ft. cyclone is recommended for a large plant, or for a medium size plant where the dust load is unusually heavy.

As to dust collecting efficiency, Kostyzak said that better than 90 percent can be expected of a large installation, or 10 to 15 percent less than this for smaller multiple type collectors. Where fines in the aggregate are scarce, he recommends two collectors. Exhausting of fines into a washer represents considerable money loss, and filler costs may be high and mineral filler worth recovering.

A question was asked: Can dust collecting efficiency be carried too far? Will it result in reducing the efficiency of the dryer, raising the related question that some collected dust should bypass? Back pressure affecting dryer efficiency can be kept down, was the reply, by having large enough piping from dryer to collector, and by increasing horse power on exhauster.

Another point: If you don't want to put all material back into the hot elevator, in the absence of a washer you usually have a damper on the fan to somewhat control what you wish to put in elevator—what to exhaust to atmosphere.

Another audience participant suggested that, if you have a back pressure problem in a dry type dust collector, one answer is to increase fan speed and horsepower as a means of overcoming resistance through the collector. Such resistance should be measured in deciding on the fan required to move a given volume of drying air.

Wet-type collectors came in for considerable discussion, led by Robert J. Marshall of Marshall Blow Pipe Co. and Dust Suppression Engineering Co. He noted, first, that some kind of efficient collector is essential today in all plants in urban areas. The important thing in plant design is to determine what pressure loss you will have through the equipment, then design the fan and motor combination to overcome the total of the static pressure resistances.

An analysis of the dust particle sizes is important in the equipment planning. Dust from a dryer is extremely fine, 90 percent often smaller than 10 microns and 40 percent smaller than 1 micron (1/25,000th in.). Exhaust air may contain as much as 16 grains by weight of dust per cubic foot, this seemingly small amount representing up to two tons per hour of dust—a serious amount, indeed.

Temperature of the dust is also a factor to consider, since the hotter the dust the more difficult it is to wet and therefore collect. In designing a layout one suggestion is to include one or more dry collectors, which will handle practically all the larger particles, leaving the finest fines for the wet unit. Marshall's advice: Include a cooling and humidifying chamber—a spray chamber able to lower the air temperature and the particle load. He recommended that the main branch of the fugitive system be introduced just ahead of the spray chamber.

The plant can be designed also to introduce outside air into the heated air, to lower the dust temperature.

Marshall was asked whether it would be advisable to use steam as well as a fine water spray to pick up micron-size dust. The answer: No. However, experiments have been conducted using steam. Also steam occurs naturally in the cooling and humidifying chamber just ahead at wet collector. Water spray in a low air velocity chamber preceding wet collector has been the best answer in his opinion.

Another contractor in the audience asked about the corrosion with wet collectors. Marshall said that his firm used ¼-in. maximum plate in places to provide durability. Stainless steel and lined construction presently are considered uneconomical. Kostyzak of Madsen in discussion said that he has advised plant owners to wash down their system with clean water at the end of each day. This has helped measurably in slowing corrosion due to dilute acids.

Hot Aggregate Screening and Storage. Panelist Dick Bartell, Iowa Manufacturing Co., has a prepared statement on this subject, which because of its completeness is published separately in these pages.

The problem of screen carry-over brought considerable discussion from the floor. A. W. Bollard, Colonial Iron Works, one panel consultant, said that in his experience it is of importance for the contractor to synchronize carefully the hot-bin screens and the dryer. The plant owner often forgets that if he installs a large dryer, he must also have larger screens to keep a balance of capacity. About 100 sq. ft. of wear cloth is needed for each 100 tons per hour plant capacity. "Watch this ratio, or you'll have carry-over trouble," was Bollard's advice.

Proportioning and Mixing. Panelist H. A. Barber, Barber-Greene Company, enumerated various ways available to approach the basic problem of accurate proportioning. The individual aggregates may be measured by volume continuously and checked by weight, measured by batch weight, and measured by batch volume and checked by weight. Likewise, the asphalt may be metered, measured by batch weight, or measured by batch volume and checked by weight.

The plant owner has the choice in operator convenience from straight manual levers to power-assist controls; or can invest in several degrees of automation from time interlocks on mixing cycles, to a complete automatic cycle. The continuous plant is inherently automatic.

The accuracy of measurement can be equal between the methods. The most important factor, however, said Barber, is that the incoming material ahead of the screens, bins, and measuring be under control. Screening and proportioning cannot provide a gradation desired in the final mix that is not there to start with.

Barber urged everyone to look toward the end result wanted in mixing, rather than to keep trying to write specifications controlling details of the constantly changing and advancing equipment.

This manufacturer again asked the oft-quoted question, "When is a mix mixed?", and dwelt on some of the unsettled aspects of the mixing problem. The answer, "When the mix is black," isn't enough, he

said. A simple test is still sought, noted this panelman, who said that his company is cooperating on research into the subject. Meanwhile Barber is convinced that there is much over-mixing, and that this is costly in plant time lost as well as contributing to oxidation of the bitumen. State especifications still vary widely on mixing time, ranging from 20 to 60 seconds for pugmill mixing without any valid basis for the time decision.

Coming back to proportioning, Barber suggested that a check can often be made by simple tests on the job rather than waiting for an extraction test report.

A delegate asked when it is advisable to equip an existing plant to meet automatic control requirements. In answering this, panel consultant E. A. Gardner of Hardy Scale Co. said that some older plants aren't worth an attempt to change over. In discussion it was observed that automation can "do anything you ask," but that it does cost money.

Meantime the pressure to come to a shorter mixing cycle is putting new demands on the operator, added Barber. Operator fatigue hence will be a factor along with tighter quality controls in going to automatic methods. The trend must continue to be beamed toward known quality objectives, continued Barber, who agreed with Gardner that some older plants designed for manual controls would be too expensive to be automated.

Priming and Tacking. Spokesman on this subject was E. Sterling Brent, Littleford Bros., Inc. He began by defining the respective meanings of "tack" and "prime", and noting the importance of keeping good control over the liquid applications that go into the complete highway job along with plant-mix work.

The bituminous distributor is often considered the ugly duckling of the hot-mix paving job, said Brent. "On many jobs, the distributor looks like something rejected by Noah when he loaded the Ark. No wonder the machine is often accused of doing poor work."

Brent reviewed the points about a distributor that must be considered if it is to do a good job. First of all is the spray bar. The bar must be set at the proper height or crown and be operating accurately so as to distribute material uniformly across the road width. Variations in application along the bar cause streaking, which can seriously affect the quality of construction.

This speaker went on to spell out the details, such as the control of the individual spray nozzle fan patterns, and the importance of constantly checking the adjustments. Also emphasized was the need for the proper pump size. A minimum pump capacity of 10 gal. per foot of spraybar is recommended for good work. Considering that a light priming application utilizes a bar length of 22 ft. or more, a pump of 350 gpm minimum capacity is recommended to insure a safety factor and to overcome piping friction. Many old distributors are underequipped.

When pumps are too small, they are forced to work at over-speed and over-capacity, resulting in excessive wear and poor pressure maintenance. Lack of pressure means light ends.

A tachometer is recommended equipment today for automatically checking and recording the rate of application. Contractors also were urged to make full use of application charts, available from any of the manufacturers.

The relationship of temperature vs. viscosity again came into the panel discussion at this point. Hindermann of The Asphalt Institute repeated his admonition that viscosity varies, even within a specification grade of material, and that a chart showing the temperature-viscosity relationship should be used for each material being applied, as an aid in arriving at the right viscosity for the project at hand.

Too low a temperature during spraying means streaking and a bad looking job, too hot also results in non-uniform spray patterns. The spray patterns will over-run one another.

Joe McCoy, of E. D. Etnyre & Co., discussed the fine points of the distributor briefly. The entire machine is designed for just one thing, to get a good spray out of the bar and nozzles. He said one overlooked point is the need for straining of asphalt on discharge side of pump as well as filling strainers to insure against clogging. Another is to have the proper size of orifice. It is more desirable to set the orifice and let the pumps do it, rather than to try to control accuracy of application entirely by controlling truck speed at all ranges.

John Brubaker of Etnyre, as a panel consultant, discussed hauling of liquid asphalt, noting how far the industry has come from the old days of converted gasoline haulers with their poor temperature control.

A modern hot asphalt hauling tank, said this speaker, represents many structural refinements in the shell, which is designed to expand under heat without failure or separation from the chassis frame. The buyer must consider many details such as type of heating tubes, number of tubes, whether to have steam or hot oil coils, kind of burner and fuel, amount of insulation, pumping equipment, and finally the matter of payload vs. dead weight under various state laws.

Aluminum tank shells are being designed to give more payload, but these involve manufacturing problems, said Brubaker. Aluminum expands suddenly and unevenly when the tank is being hot-filled, and high temperatures reduce the structural strength. The aluminum jackets are used successfully to reduce weight.

Whether the asphalt plant owner hauls for himself or is supplied by the refinery or contract hauler, he has a real interest in transport equipment that will insure safe, economical delivery under good temperature control.

Brent of Littleford tuned in on this subject briefly to urge that the states get together on more uniform laws governing axle loads, gross loads and other factors affecting over-the-road tanker operation. Present laws hamper factory standardization.

The need to check for worn pumps and out-of-adjustment points in the equipment was one of the closing points on liquid applications. Panelist Brent offered the services of his industry, which recently has formed the Bituminous Distributor Manufacturers Bureau under sponsorship of the Construction Industry Manufacturers Association.

Spreading and Finishing. The topic of laydown of bituminous mixtures was headed by Don Palmer, Pioneer Engineering Div., Poor

Continued on page 208

ASPHALT

Produced by Esso Standard Oil Company

The Maine Turnpike is another example of how Asphalt supplied by Esso helped build a better road at lower costs. The Maine Turnpike Authority saved more than $21,000 per mile over equivalent slab type construction. Compare these advantages:

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If hot bins and their screens were glass walled, their operation could be watched more systematically—but still remaining would be the basic questions here discussed.

Screening and Hot Storage of Hot-Mix Aggregate

By Richard Bartell
Iowa Manufacturing Company

Based on a talk to the Equipment Panel Discussion, National Bituminous Concrete Association convention; Detroit, Michigan, February 1, 1960.

The problems of screening and hot storage of aggregate are getting increased attention these days, but have you ever wondered "Is it really necessary?" I've heard people say that the plant uses exactly what's fed into it so why not calibrate the cold feed and eliminate the screen. After all, screening just gives the person who sets the proportions two chances to make mistakes.

Actually, there are very good reasons for requiring screening and multiple compartment storage of hot aggregate. In fact it is virtually impossible to produce uniform high-type mixes without doing so.

Several causes of aggregate variation make re-screening necessary. Stockpile variation is one ever-present problem because even the most carefully built storage may show segregation. Cold feed variations may also occur. Segregation and degradation occur to some extent in the dryer, especially during start-stop operations, along with partial loss of fines through the exhaust system.

The segregation which occurs in a single-compartment bin is a major problem because the courser material tends to roll to the outside, while the fines stay in the middle. This results in the gradation of the material withdrawn shifting from fine to coarse as the bin level rises and falls.

Recognizing that these problems make screening mandatory, how many bin compartments and what screens are needed? The Materials Engineer would, of course, like to have as many bins as he has sieve sizes for the mix, but eight to ten bins is impractical. Presently 75 percent of the states require at least three bin compartments, not counting mineral filler, with one state stipulating five.

The aggregate degradation for bituminous concrete ranges from the minus 200 mesh dust up to a top size which is usually between ¼ and ¾ or 1 in., some bases mixes go up to a top size of ½ to 2½ in. The number of bin compartments required depends upon this size range.

With a properly designed bin, little or no segregation takes place in the material smaller than 6 to 8 mesh size, which is fortunate because screening difficulties and the required screen size increase rapidly as the screen cloth gets finer. Some authorities feel that No. 4 mesh (⅜ in.) material should be in the fines bin to reduce caking, while others set the limit at 10 mesh (⅛ in.) to minimize any possible segregation.

The size selected for the fine screen establishes to a large extent the proper sizes for the succeeding screen decks and the number of

compartments to be used.

A two-to-one size ratio for succeeding compartments should be used. That is, the largest material in a bin compartment should not be more than twice as big as the smallest. If this ratio is substantially exceeded, segregation in the bin will result. For a ½-in. top size mix, 3 or 4 compartments should be used, depending upon the fine screen selected, 4 compartment if a No. 10 mesh screen is used; and 3 compartment for No. 6 mesh. Larger top size mixes require additional compartments following the two-to-one ratio. Of course, these ratios may be shaded slightly to balance available screen deck areas and bin compartment numbers and sizes.

Now comes a good question, "How much screen carryover is allowable?" Commercial screens are not as efficient as laboratory sieves. You can put material in a lab sieve and shake it until screening is 100 percent complete. While the material passing over a production screen has only one short chance to be separated, 90 percent efficiency is good for a production screen. The efficiency of a screen will be almost constant from half to full capacity. So, it is normal practice to use a slightly larger size opening than the size separation desired. This allows virtually all the desired material to pass while the inefficiency keeps the slightly larger size out.

Up to a point, carry-over is not harmful as long as it is constant. But, for a given overloaded screen, the carryover will change as the feed rate changes, hence bin proportions have to be varied with the production rate.

Use of slotted screen cloth will enable a 25 to 40 percent increase in screening capacity for a given size separation, in ¼-in. and smaller materials. However, if slivery material is being used, too much oversize may get thru into the bin compartment.

The solutions to these problems must necessarily be a compromise between ideal and practical; however we must not compromise the quality of bituminous concrete construction.

Views And Comments

By H. G. Nevitt

Careful Does It!

In our view, Dr. Norman McLeod did a great service to asphalt technology in his talk on surface treatments before the AAPT meeting at Memphis last January. He brought out that while numerous examples of poor workmanship can be seen in many countries, there are others where excellent results have been consistently attained even on roads subjected to what we would classify as heavy-duty traffic. We do not think that there can be disagreement with Dr. McLeod's opinion that these good results came about through understanding of the operation and meticulous attention to every detail in carrying it out.

The surface treatment has a definite place in the American paving picture. It is often a component part in stage construction, which we consider the most logical approach in the building of any highway system despite the opinions to the contrary indicated by the actions of many highway agencies. It is ideal for light traffic pavement, representing in many cases the lowest possible cost. However, even in its proper sphere of use it is subject to two common handicaps. One is its possible unsuitability to the specific conditions of the particular project; for example, a surface treatment is not the proper type of treatment to place over a sand base. The other is the failure of the constructing agency to properly engineer the building of the pavement.

Our remarks in their favor do not mean we are giving a blanket endorsement to surface treatments for the construction of light pavements, or that Dr. McLeod's discussion does not require some clarifications (although these may be in the full text when published). If thin hot mix pavements are feasible in cost due to the nearby location of a commercial plant and other favorable factors, such a mat will be a better buy than a surface treatment as long as the cost differential between the two is small.

However, this is only occasionally the case; and in the absence of an economical source of hot mix, the surface treatment is an ideal solution. This is true particularly when the treatment serves as the initial course in a stage construction project or the natural development of the highway. Our caution concerns the implications to be drawn from Dr. McLeod's presentation at Memphis due to the type of surface obtained. His discussion was devoted entirely to what might be practically described as one size aggregates – although, of course, there is actually some gradation in nearly all cover aggregates for either seal coating or surface treatments. Surface treatments constructed from such aggregates fail to give the base the structural support that can be supplied from a dense graded aggregate mixture; and therefore in paving over soils and bases in which such flexural support is essential to economy in the road structure a different approach is required. However, surface treatments which nearly (but not quite) equal mixed mats in this respect can be constructed, and we have seen some excellent types of such pavements in other parts of the world although not too frequently in this country.

The essential point made by Dr.

Continued on page 202

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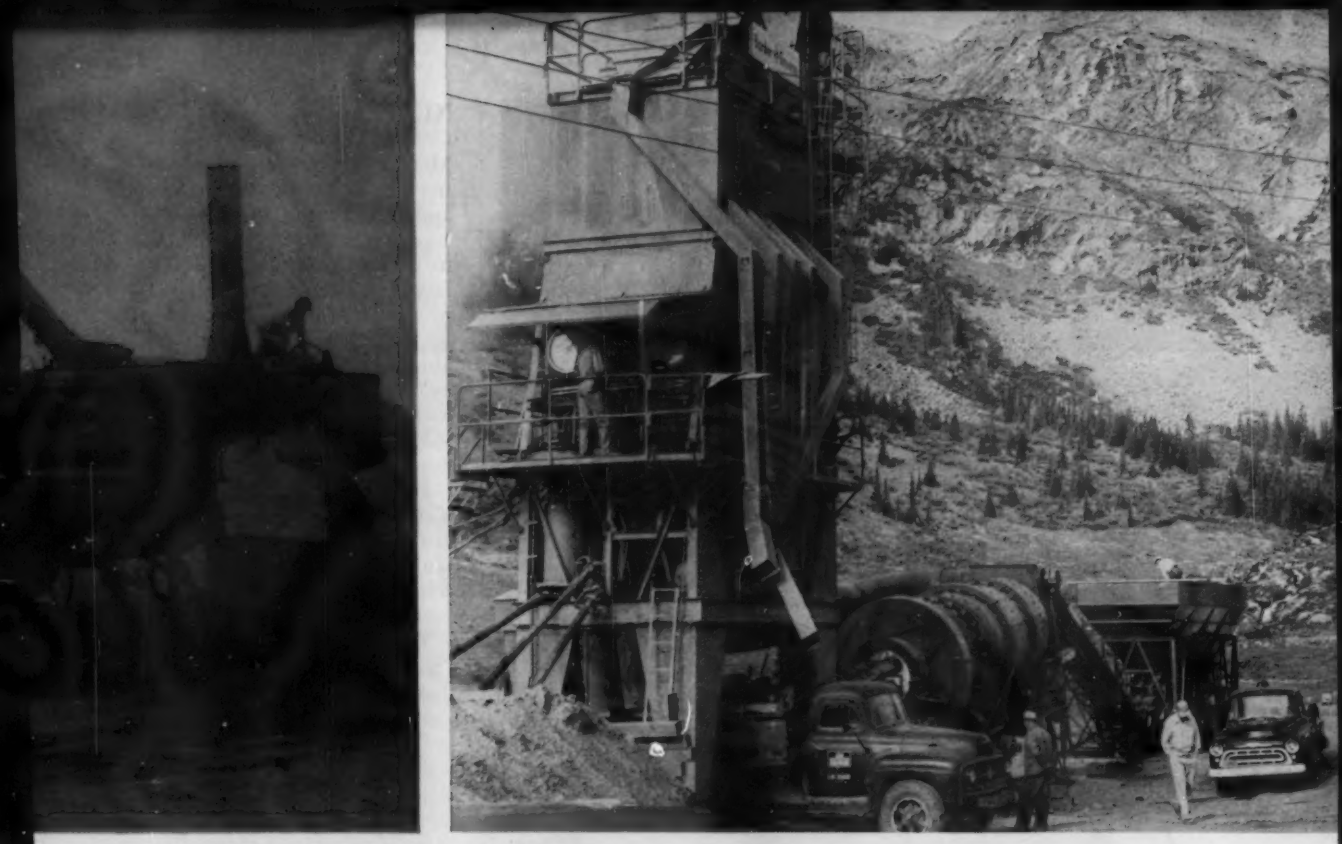

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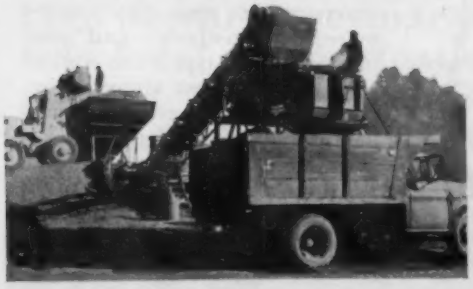

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NEVITT

Continued from page 199

McLeod was that the proportioning of the materials, the material and construction controls, and the actual details of construction had to be very carefully worked out if favorable results were to be expected. We can emphasize his point by stating that where this is done almost invariably a fine surface can be obtained. We can likewise agree with him that too often such is not the actual result and something should be done about it.

In view of the importance of this matter as we see it, it is our plan to discuss in a later issue the common faults seen in seal coating in this country. Meanwhile, we can make some general points.

1. Sufficient has been written about seal coating to bring out all the principles involved. There is nothing in the operation not readily available to practically any highway agency even in the smaller sizes. As in most technical developments, there is not always agreement between the supposed authorities, some of the statements made or approaches advocated are incorrect, and the general principles laid down must be applied to any situation with judgement and common sense. But the fact remains that highway engineers are in a position to do this.

2. There is nothing required in the operation which is not available to even the smallest highway agency, namely: Personnel of ordinary intelligence, education and experience—the last two to some extent being interchangeable; materials equal to those used in other highway work; usual highway equipment (though as in most fields specialized machines are proving increasingly beneficial); and skills which are not difficult to acquire provided there is desire and awareness of the need for them.

3. The above sums up to the statement that what mostly is required is knowledge and good judgment of the type which is available (although not always called upon) in almost every highway building agency.

We urge that our readers who might have some concern with this subject give it thought and profit from the lesson which Dr. McLeod has brought to us.

How the mixture looks before compaction—a dam p mix incorporating carefully controlled amounts of foamed asphalt and water finely dispersed.

Contractor Equips for Foamed Asphalt Stabilization

Parking lot for Sioux City (Iowa) supermarket was local demonstration ground for this method of stabilizing troublesome fine-grained loess soil.

Foamed asphalt has come out of the laboratory as a new method of soil stabilization. The process developed by Ladis H. Csanyi of Iowa State College has been employed for a parking lot in Sioux City, Iowa, and is scheduled for other immediate applications in various Iowa cities.

The foamed asphalt theory permits the thorough asphalt impregnation of fine-grained soils where aggregates are scarce or costly. A nozzle developed and patented by Professor Csanyi figures in the practical mixing and stabilization process.

The parking lot in Sioux City—owned by a super-

Continued on page 207

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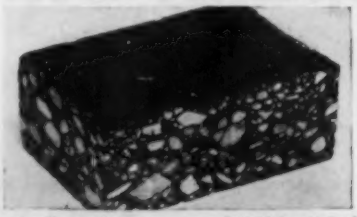

This photo of cross section of *VIBROmatic*-laid mat tells the story. Note uniform compaction and distribution of material *from the bottom up.*

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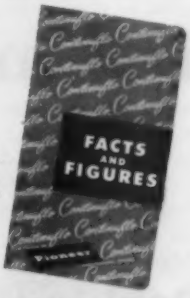

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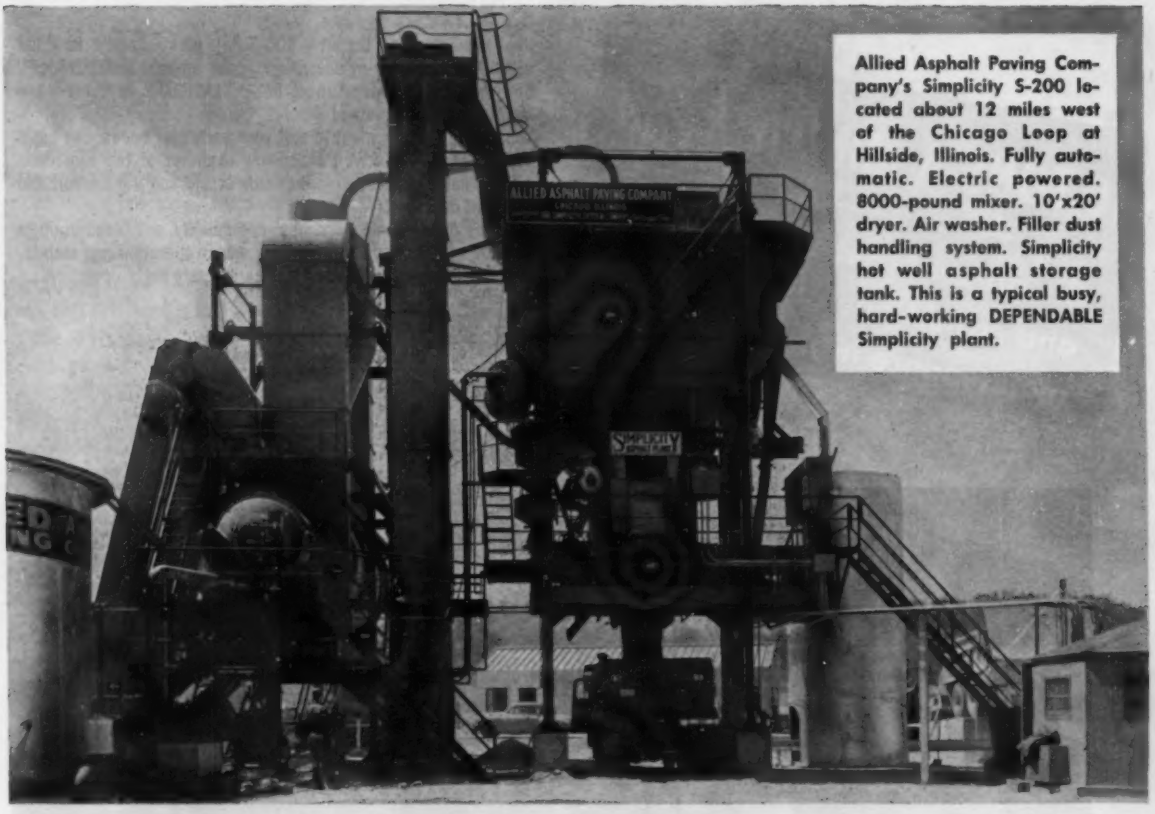

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FOAMED ASPHALT

Continued from page 203

market—was set up as a pilot project by Byron Brower, a contractor who sees in the method a source of business for local residential streets in this aggregate scarce area. For the mixing he used a P&H single-pass stabilizer fitted with special blades. The machine's three sets of beaters include one which cuts the proper grade, one which pulverizes the soil as the unit passes over it, and a third set which introduces foamed asphalt and mixes it into the soil. Eighteen of the special nozzles are used.

Two asphalt transport trucks and one water tanker were employed for the work. One transport was towed by the stabilizer, with one waiting turn. The stabilizer added necessary water required in the foamed asphalt procedure.

According to Csanyi, Sioux City is a particularly important place to show the method's possibilities. The local soil is a "bad actor"—glacial loess. Loess will constitute the aggregate for most asphalt jobs undertaken in the Sioux City area with the foamed asphalt application.

The loess soil has the following gradation:

Sieve No.	Total Percent Passing
4	100
10	99
40	99
80	99
200	99
Clay	19.5

To prepare the soil to be stabilized, approximately 30 percent of blow sand, of which the nearby Missouri River provides an abundance, was introduced. Blow sand gradations follow:

Sieve No.	Total Percent Passing
4	100
10	100
40	82
80	16
200	0

The stabilization of the soil in the area was conducted as follows:

1. A layer of 2 in. of blow sand was spread over the surface to yield about 33 percent sand in the 6-in. stabilized base.

2. Sufficient water was sprayed over the sand to provide about 11 percent moisture in the base prior to application of the foamed asphalt cement.

3. A single pass of the P&H stabilizer was made over the moist sand and soil in which process the soil was cut out and blended with the sand and 6 percent foamed asphalt cement (120-150 penetration) was mixed with the blend as the machine moved forward at a speed of 27 ft. per minute.

Mixing foamed asphalt and loess with a P&H stabilizer. Inspecting sample are Byron Brower, Construction Co., Professor Ladis Csanyi, and Rupert Brockelsby, Harnischfeger factory expert.

Note appearance of the stabilized loess. Conventional rolling methods are employed.

The third set of beaters mixes the foamed asphalt with the prepared aggregate.

4. The stabilized soil blend was then compacted by a sheepsfoot roller equipped with a drag, until the roller walked out. This rolling followed stabilization by about one half hour.

5. Sheepsfoot rolling was followed by light shaping of the surface by a grader and final compaction with rubber-tired and steel rollers.

6. The finished stabilized base, 6 in. in depth, was surfaced with a double inverted penetrator seal, using 5/8 chips and RS2 emulsified asphalt.

7. In sections where rain was encountered, increasing moisture content above 12 percent, an aeration pass was made after the stabilization pass was completed. The loose material was allowed to aerate until moisture was reduced to a point where satisfactory compaction could be attained. Where no rain was encountered, no aeration was required.

A survey of the finished job, several weeks after completion, indicated a tight seal and no flaws were evident, Brower said. However, he noted, the final test will be northwest Iowa's abrupt temperature changes and severe winter conditions.

What is 'Foamed Asphalt'

This brief outline of its theory and usefulness was supplied by Ladis H. Csanyi, Professor in Charge, Bituminous Research Laboratory, Iowa State College.

Research conducted at the Bituminous Research Laboratory at Iowa State University has disclosed that an asphalt cement, when converted into a foam, acquires some rather unusual properties. It increases in volume; its viscosity is materially increased; it becomes softer at lower temperatures and remains softer for a long period of time; it becomes stickier and more rubbery; it acquires a surface energy which permits it to adhere more tenaciously even to damp or moist aggregates; and when the bubble of the foam bursts the asphalt recovers its original properties.

Consequently, it was foreseen that if these properties of a foamed asphalt could be utilized in mixing, more uniform mixes could be secured, damp or moist aggregates could be used in mixtures. And also mastics, of fine dust particles coated by thin films of asphalt, could be used to bond coarse aggregate particles together, thus permitting the use of ungraded local aggregates in mixtures and make foamed asphalt cement applicable in soil stabilization.

The application of foamed asphalt to mixing was accomplished by the development of an asphalt foam nozzle and a system (Fig. 1 and 2 Bulletin 240, ARBA) by which asphalt cement can be introduced into a mixer as a foam of proper character, at a specific time in a manner and quantity desired. Since the nozzle operates at 25 psi asphalt pressure and 40 psi steam pressure, this system, patented by the Iowa State University Research Foundation, can be adapted to either batch or continuous type asphalt plants with but slight plant modification. It can also be adapted to mobile plants such as the P & H single-pass stabilizer for mixed in place operations.

Full scale tests have demonstrated that the Foamed Asphalt Process adapted to such plants and operation is commercially feasible.

Readers desiring more details are referred to "Foamed Asphalt," technical Bulletin 240 (1959), American Road Builders Association, World Center Building, Washington 6, D.C.; or "Foamed Asphalt in Bituminous Paving Mixtures," Bulletin 160, The Highway Research Board, 2101 Constitution Ave., Washington, D.C.

DETROIT NBCA MEETING

Continued from page 196

& Co., Inc. He pointed to the new competition in the self-propelled finisher field, and the recent rapid design evolution of these machines. Rubber-tired mobility, refinements in spread control, details that lessen operator fatigue, adjustments to lay wider or deeper mats, as some of the welcome innovations. He agreed that automation in laydown is a desirable further evolutionary step.

In discussion, conference leader Radzikowski spoke of the need for more public highway agencies to adopt results-type specifications, giving the manufacturer and the contractor a freer hand in the finishing. James Cougler of Blaw-Knox, as a panelist consultant, said that the contractor who buys a finisher wants it to cut his labor costs and save him money, and now also is more interested in the quality of the job. He, too, agreed that automation is a desirable development, and that manufacturers will be working toward this.

Another consultant on this subject, R. F. Plumb, of Iowa Manufacturing Co., said that the primary job of a spreader is still to feed the road or street a uniform amount of material. Feeder hopper and gates are put there to do just that, but are often found out of adjustment or run by an operator not properly trained. His words, "If slot feeder gates were watched a little more carefully, and adjusted to suit the forward travel and tons per hour being laid, the operator could do a much better job than he accomplishes by starting and stopping the machine, running the truckload out and then stopping to wait for the next load."

Compaction of Bituminous Pavements. This closing subject was led by Fred Kimble of the Ohio department of highways, with panel consultants Edw. McCormick of Buffalo-Springfield, W. R. Troyer of Galion Iron Works & Mfg. Co., and J. S. Lowry of Browning Mfg. Co. This rather detailed and technical discussion, utilizing slides, went into fundamental relationships between density, voids, temperature during rolling, stability, and other factors, as well as types of equipment and methods of rolling.

Notes on AAPT's Memphis Meeting

By Henry G. Nevitt

The trend noticeable in recent meetings of the Association of Asphalt Paving Technologists toward more technical papers, continued with the Association's 35th Annual Meeting, held January 25-27, 1960, at Memphis, Tennessee. But the symposium at Memphis on field and laboratory control and a paper on surface treatments were of interest to those with a strictly construction viewpoint. And much of the discussion concerned the practical application of the information presented.

Mix properties as affected by different fillers were discussed by Kallas and Krieger. Indicative of one development in mix design was the inclusion of the effect of these fillers on compaction. Both the filler and the asphalt consistency were shown to affect this, raising the question—important in this day of heavy duty pavements, with their trend toward low asphalt contents—if these factors could not permit increasing the asphalt content. The benefits from more filler on flexural strength was shown by Ekse, whose data likewise indicated the great help given the base by this property. Another property of mixes was developed by Monismith, who showed that reversible age hardening had no apparent effect on the mix stability, at least to an appreciable degree for the aggregate studied, so that this property could be disregarded in repetition testing.

A number of theoretical or research papers were given. Baker and Lottman discussed drying theory. Corbett and Swarbrick reported further results from composition analysis; their approach promises to continue providing valuable information on hardening and oxidation. Jiminez and Gallaway outlined their effort to appraise the full effects on an asphalt of a pine tar extract additive. This paper highlighted the difficulties existing today in evaluating asphalts, since it was not always clear whether the changes reported were due to effects on the asphalt or merely the presence of a portion of a different material. Somewhat the same position might be taken on the paper by Wurstner, Craig and Higgins, in which conventional petroleum antioxidants were shown to have questionable merit with asphalts—a not surprising conclusion, since the oxidation mechanism may be quite different—but heavy polymers may have promise.

A paper by Allison, Quiring, Groening and Krchma on a new laboratory oxidation mechanism

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showed that oxidation is quite specific to the conditions; the conclusion is that, for example, an accelerated high temperature loss test cannot be depended upon to indicate the relatively low temperature road oxidation tendency, even though an approximate relationship may exist between the two. Another laboratory study by Abson and Burton indicated that trichloroethylene can be used instead of benzol in recovery extractions with benefits in fire hazard and toxicity.

Papers of more direct application interest included a report on tests of welded wire reinforcing to control reflection cracking: while delaying the action, and perhaps indicating the possibility of eliminating such cracks from expansion movement (though perhaps with an improved procedure) the paper reached no conclusion as to whether reinforcement seemed a better approach than the use of the thicker overlays which could be obtained for the same increase in cost.

A description of the ingenious new laboratory miniature highway installed at Whiting, Indiana, by Speer, was accompanied by a request for suggestions in its improvement, since it appears to offer a very economical means of solving practical highway problems.

The properties of epoxy resin asphaltic concrete and the possibilities of such a material were subjects of Evans, Lettier and Nelson. A further analysis of the properties of highway asphalts (similar to that reported on in this magazine some months back) was given by Welborn, Halstead and Boone.

For the field man the discussion and pictures of surface treatments seen over the world by McLeod were of great interest. The evidence that these relatively cheap types were being laid to successfully carry extremely heavy traffic, primarily through meticulous attention to their design and construction, was a valuable contribution even though some American engineers would question that the type of surface treatments described fully meet the functional requirements of an asphalt pavement or that the methods of construction are adaptable to our quantity production approach.

Quality control was the subject of a paper by Shook describing the procedures on the AASHO road test and also of the symposium on field and laboratory control of asphaltic concrete. The discussion of the first paper brought out that statistical quality methods are with us, and that they involve little more work (after the needed procedures are understood) than those methods advocated by engineers experienced in paving work. The mechanics of achieving laboratory control on the job was the principal subject of the symposium, which gave some idea of the advances made by the leading highway construction agencies in systematizing field control.

While the meeting was rewarding and indicated the rapid advances being made in asphalt paving technology, it likewise brought out the complexity of the subject and some of the needs in future work.

As an example, the papers discussing the increased strength possible from more or better fillers or stronger binders made no mention of the fact, long known by experienced asphalt construction men, that such higher strength is usually accompanied by more tendency toward expansion and other types of cracking and, in general, loss of some of the advantages of the flexible type.

Those confronted with actual construction must correspondingly make a practical compromise between high strength and high rigidity. Studies which bear on the strength factor alone give no indication as to where the point of compromise properly belongs and whether it represents a net gain; the entire picture is required if such investigations are to be completely practical in their findings.

Many other instances of failure to bring in all the factors bearing on the problem appeared in the papers and discussion, and this difficulty will be accentuated as progress is made in this highly complex field of technology.

Yet such progress is apparent, as is evidence that the tempo of engineering advancements in asphalt paving is accelerating. In fact, the building of asphalt pavements is steadily changing from an art to a science.

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MOBILE LUBE EQUIPMENT

Continued from page 163

petroleum supplier will take operating conditions into consideration when arranging for the job's fuel requirements.

Fuel and Lubricant Consumption

The earthmoving contractor is a heavy user of petroleum products. It is not his major item of expense but will constitute about 4 percent of the contract dollar, roughly divide 3 percent for fuel and 1 percent for lubricants. The success of the venture can well depend upon the proper use of the lubricant 1 percent, as it most directly affects the expense of maintenance.

An example of the actual amounts of fuels and lubricants used in a particular dam construction project may prove informative. This project involved moving 12,000,000 cubic yards of material with over 50 major machines. The job used 250,000 gal. of gasoline, 2,300,000 gal. of diesel fuel, 77,000 gal. of diesel engine oil, 20,000 gal. of hydraulic oil, 11,000 gal. of air cleaner oil, and 87,000 lb. of multi-purpose grease and 121,000 lb. of gear lubricant. Practically all fuels and lubricants were supplied through mobile dispensing equipment.

Mobile and Centralized Lubrication

Illustrating a growing trend, Fig. 10 shows a centralized lubrication system on a heavy construction dump truck. The metered manifold distributor located on the undercarriage has feedlines branching out to lubricate critical bearings with metered amounts of lubricant. Several manifolds conveniently located will permit greasing the truck in minutes, with no need for searching out, cleaning and individually lubricating a large number of fittings.

"Shhh—I think he's falling asleep!"

Lubrication on the Farm

The very small (one or two machine) contractor, much like the individual farmer, may be his own maintenance man. He may rely on the familiar hand gun and filler pump for lubrication. One type of this popular combination will be seen in Fig. 13. Another type grease gun that combines flexibility with portability will be noted in Fig. 11.

The trailer rig in Fig. 12 may also be used advantageously to service units operating in a small area. Again the use of a minimum number of lubricants is highly advantageous. A heavy duty motor oil, a premium hydraulic oil, an EP gear lubricant and a multi-purpose grease will satisfy the lubricant requirements of practically all of the equipment.

In Summary: Mobile lubrication equipment has provided a highly successful method of lubricant application to a wide variety of equipment. Because of the nature of its operations the heavy construction industry has been the major user of this method.

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All too often, close proximity of a construction site does not allow sufficient time for construction employees to stop work and to vacate areas made hazardous by lightning. Advance warning of an approaching electrical storm is desirable.

An ordinary AM (not FM) radio or automobile radio will provide advance warning if properly tuned and located so that its crackling will be within hearing range. The radio should be tuned as follows:

1. Set the dial to a frequency where no station is heard so that no broadcast program will hide the noise of static.

2. Turn the volume up to a point where the crackling of static discharges can be easily heard.

The audible crackling of static discharges will provide advance warning of the approaching electrical storm, and allow the employees to discontinue operations and take proper cover.

Radios in underground operations should use outside antennas. *From "Construction Safety Hints," prepared and distributed under auspices of the Construction Section, National Safety Council.*

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Wheel assemblies easily shift from radial arc position to towing position.

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Design permits heavy electric motors and drives on discharge end.

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Power Lift and Power Travel lets operator pinpoint stacker discharge.

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Immediate delivery. Financing if desired on entire rig; or on crawler w/crane boom, less shovel front.

Price, f.o.b. railroad tracks in northern Virginia $30,000.00

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Bring Results

16"x48" Traylor Jaw Crusher
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2 Model CK Speedpulls, Cummins power LeTourneau-Westinghouse Speedy, 3 axle Machines with Hydrair Suspension. 14-20 yds.

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Labor Law

Union Tries for Thruway Employees

Unionizing moves took place recently involving the New York Thruway's 500-man maintenance staff. Representatives of Council 50, American Federation of State, County and Municipal Employees, AFL-CIO have conferred with County and Municipal Employees, Thruway representatives, looking toward a union shop agreement on behalf of all Authority toll collectors and maintenance employees.

In answering, the Authority quoted Section 75 of the Civil Service Law of New York State which forbids their removing an employee for failure to join a union or pay union dues. Therefore the Authority lacks the power to enter into such a contract as requested by Council 50.

Representatives from the Thruway Authority agreed to confer with representatives of Council 50 with respect to working conditions and grievances of employees who are members of the council.

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In Scottsdale—the "West's Most Western Town"—12 miles northeast of Phoenix in the Camelback Mountain resort area.

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Large fireproof hotel surrounded by parks — near all sightseeing and Union Station. Garage on premises. Coffee Shop—Cocktail Lounge — convention facilities.

From $5.50 Single With Bath

spacious guest rooms, air-conditioned if desired

HOTEL CONTINENTAL
WASHINGTON
D. C.

BIGGEST PRESTRESSED CONCRETE BRIDGE

Continued from page 155

three 1-yd. laydown buckets alternately filled the hoppers.

Concrete problems were resolved with the help of a retarding densifier (Plastiment). The problem was to keep the concrete plastic until each 110 cu. yd. cantilever girder was completely cast, thereby preventing cold joints. The effect of changes in air temperature during casting was offset by varying the proportion of the additive, which also helped maintain good workability without using excessive water, and thereby assured a denser concrete free of small voids between the heavy reinforcing and the tendons.

The 7½-sack mix design using Type II cement gave strength gains (4,000 psi at 4 days or less) essential to the scheduled production of two and sometimes three girders weekly.

The densifier proved especially important as most of the concreting was done during the summer, often in 90-degree temperatures. The rate of heat development and the maximum internal temperature were reduced by the use of this particular admixture.

Concreting proceeded more satisfactorily than was anticipated; the bridge is planned to be opened in the summer of 1960. Now that the girders for the two bridges have been assembled, the 14-ft. high roadway approach fill is being placed to the tops of the cantilevers, level with the highway, and the crew will then pave the bridge deck. Terry Contracting, Inc. is performing almost 100 percent of the work with its own men.

Post-tensioning steel was furnished by Joseph T. Ryerson & Son, Inc., which firm also provided placement drawings, hydraulic jacks and grouting equipment, as well as technical advice and assistance for all placing, stressing and grouting operations.

The Oneida Lake Bridge is expected to be practically maintenance free. The bearings and bearing plates are of stainless steel, as are the anchor bolts used to fasten the plates to the concrete. The downspouts likewise are of this steel and the bridge railings are aluminum.

The bridge is being built under the direction of C. F. Blanchard, deputy chief engineer of bridges, department of public works, state of New York. Summers, Munninger & Molke, Albany, N. Y., are the consulting engineers, with E. Molke, Partner, as project engineer. Terry Contracting, Inc., is represented by William Mayhew, vice president and chief engineer, Philip A. Wolf as chief estimator and Lloyd Monroe as construction superintendent.

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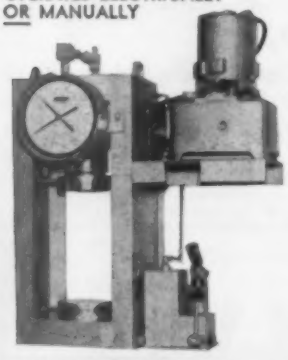

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Manufacturers' Literature

MATCHED JAW CRUSHER: Information regarding Universal's new matched jaw crusher is available in bulletin form from Universal Engineering Corporation, 625 C Ave., NW, Cedar Rapids, Iowa. The publication explains advantages of two moving jaws in a single crusher. It is reported that this feature facilitates faster feed, crushing and discharge of material. Features of the crusher unit include longer jaws, positive gear type drives and simplified jaw adjustment.

For more details circle 142 on Enclosed Return Postal Card.

TRUCK, TRAILER LEGAL SIZE AND WEIGHT: A new 70-page booklet describing truck and trailer size and weight restrictions throughout the United States and Canada has been prepared by FWD Corp., Clintonville, Wis. The booklet can be obtained by writing to the firm's merchandising manager.

For more details circle 143 on Enclosed Return Postal Card.

TAILGATE ASPHALT MIXER: A new 4-page illustrated brochure describes how stockpiled asphalt can be heated and remixed with a Wylie Heat-A-Mix Tailgate Asphalt Mixer. Write Wylie Mfg. Co., Inc., Box 7086, Oklahoma City 12, Okla.

For more details circle 144 on Enclosed Return Postal Card.

NATURAL GAS ENGINES: The complete line of Caterpillar natural gas engines for all applications is described in an 8-page booklet recently published by Caterpillar Tractor Company, Engine Division, Peoria, Ill. The booklet traces the development of the natural gas engine and shows model views, specifications and fuel consumption curves of current models. Request Booklet 20173.

For more details circle 145 on Enclosed Return Postal Card.

TANDEM ROLLERS: Operating and construction features of Galion's 3 to 5 ton and 4 to 6 ton variable weight tandem rollers are fully described and illustrated in a bulletin, No. 435, available from The Galion Iron Works & Mfg. Co., Galion, Ohio. Also described is a pneumatic-tire towing attachment for the 3 to 5 ton size. This hydraulically-operated towing attachment permits the roller to be towed from job to job by any truck.

For more details circle 146 on Enclosed Return Postal Card.

SAND BINDER: A new edition of a bulletin covering the use of Sand Binder 230 is available from Technical Service and Development, Dow Chemical Company, Midland, Mich. Cited as advantages over conventional binders, the firm lists greater flowability, compactability, and permeability; less contamination by products of combustion when sand is reused and higher rebond activity and greater effectiveness at low concentrations.

For more details circle 147 on Enclosed Return Postal Card.

SELF-PROPELLED SCRAPER: The 28-yd. 360-hp Model B Tournapull—largest self-propelled scraper in the LeTourneau-Westinghouse equipment line—is the subject of a new illustrated brochure released by LeTourneau-Westinghouse Company, 2301 N.E. Adams St., Peoria, Ill. The literature details features of the machine with speed, power and agility-pointed out as prime attributes.

For more details circle 148 on Enclosed Return Postal Card.

TRUCK CRANE: A new 20-page catalog describing the American 200 Series 22½ ton truck crane, has been released by American Hoist & Derrick Company, St. Paul 1, Minn. On-the-job photographs, as well as illustrations and descriptions of the unit's time saving features and versatility on many jobs is covered in the catalog.

For more details circle 149 on Enclosed Return Postal Card.

DIESEL ENGINES: The International UDT-817 six-cylinder diesel engine—manufactured by International Harvester Company's Construction Equipment Division, 180 N. Michigan Ave., Chicago 1, Ill., is the subject of a 16-page catalog recently issued. The four-cycle engine is available in turbocharged or naturally-aspirated models. In the former, 385 maximum hp is developed at 2,100 rpm, while the latter is rated at 250 hp at the same rpm.

For more details circle 150 on Enclosed Return Postal Card.

CONSTRUCTION MACHINERY: New literature covering construction machinery manufactured by Allis-Chalmers Mfg. Company, Milwaukee, Wis., is now available from the company's Construction Machinery Division. Bulletin No. 1092 pictorially reviews the A-C 7,000-lb. capacity rubber-tired TL-16 Tractoloader. Another is No. 1093 which concerns the larger, 9,000 lb. TL-20 Tractoloader. Specifications are included in both. A newly-revised catalog, MS-1153, covers the firm's HD-11G tractor shovel. A revision and updating of a similar catalog is MS-1148, which describes the Model 45 Motor Grader. In literature No. MS-1348, the products of the recently-acquired Deerfield works are discussed and illustrated.

For more details circle 151 on Enclosed Return Postal Card.

GOOD HAUL ROADS

Continued from page 143

can be found by dividing the haul and return distance (say 2,000 ft.) by travel speed in feet per minute (1 mph equals 88 fpm). So, for 1,000-ft. haul and 13 mph:

$$\text{Cycle Time} = 3 \text{ min.} + \frac{2000}{1144}$$

= 4.8 min. In the 12 to 20 mph speed-of-travel range, each mile per hour gained in travel speed by a 20-yd. scraper will result in about 5 cu. yd. *more* material moved per hour, assuming the machines will work about 45 min. out of an hour.

With the five-unit fleet described above, a gain of 3 mph will yield an extra 75 cu. yd. per hour, without additional equipment, while adding, free, additional road safety and machine life. Moving 33-cent dirt, the contractor could spend up to $25 additional on the haul road for each hour the machines roll over it. On a 100,000 cu. yd. cut, a 3 mph gain would justify up to $2,400 more expenditure on the road.

With the extra money available for improving the haul road, where should it be invested to do the most good? Too many contractors with a haul road problem merely assign another grader to patrol the road. The operator's instructions are to keep the road smooth and stay out of the scrapers' way. Such attention rarely produces the desired results.

Frequently the haul road is simply a bulldozer trail slicked up with a few passes of a motor grader. Chuck holes are filled with loose dirt, soft spots are capped by some dry dirt and a few rocks. The first pass of a heavy scraper reopens the chuckholes, and the dry material packs down into the soft spots. Succeeding sweeps of the big haul units deepen the ruts. The road becomes rough, and the operators slow down their scrapers to stay in their seats, if not to keep from tearing up their machines. Poor drainage and flying dust add to the problems. A grader in knocking dust into the ruts adds to the confusion. Some contractors have tried larger graders to speed haul road maintenance, but the basic condition still exists—the road is inadequate.

Instead, the contractor would do better to re-evaluate the haul road. Holes and soft spots should be filled and compacted. Ditches and drain pipe should be installed to carry away water. Chemical agents might be added to reduce dust if this is a hazard. The work can be accomplished with the equipment already on the job. Scrapers and bulldozers can supply the fill. A few passes of the compactor can firm up the road. A motor grader can crown the road and cut drainage ditches. After the road has been put in good shape, only occasional passes of the motor grader will be necessary to remove bumps and spilled material.

Haul roads are a good investment, and are not the luxury of long-term operations. They can more than return their value in increased production, greater safety and less costs for operation and maintenance.

Prestressed Concrete Inlay for Runway

The Air Force is planning to permit use of a prestressed concrete inlay for the reconstruction of the primary runway and taxiway in Fairchild Air Force Base, Washington. This will be the first time in the United States that a prestressed concrete pavement project of such magnitude will be bid competitively with conventional concrete pavement.

The pavement scope for Fairchild AFB will be approximately 79,000 sq. yd. for the runway and 53,100 sq. yd. for the taxiways. Construction at Fairchild AFB is tentatively scheduled to begin in the spring of 1961.

Tolls Planned for Delaware "I" Link

Delware may build a portion of its Interstate System mileage as a toll project, William J. Miller, Jr., deputy chief engineer of the Delaware state highway department, told a recent conference group. A study is being conducted to determine if such a move is possible and advisable. If feasible, toll financing would speed Interstate System construction in line with the state's expected need, he said.

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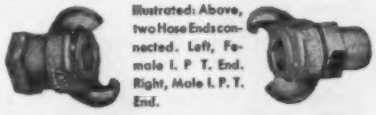

Illustrated: Above, two Hose Ends connected. Left, Female I. P. T. End. Right, Male I. P. T. End.

The "Air King" will reduce operating costs wherever quick connections are required. Locking heads are identical for all sizes of hose or threaded ends, permitting the coupling of any two sizes of hose within the "Air King" hose end size range, or coupling to any pipe up to 1" by use of the male or female threaded ends. Heads are locked by pressing together and applying a quarter-turn. A patented Safety Locking Device eliminates all risk of the coupling coming apart. Available in bronze or rustproofed malleable iron, in sizes up to 1".

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Florida converts inadequate road into a dual Asphalt highway

When Florida built the new Sunshine Skyway Bridge over Tampa Bay, U. S. Route 19 in Pinellas County could not cope with traffic to and from the bridge. The State remedied this by converting the old 24-foot road into a modern, divided Asphalt highway.

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